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CHEMICAL AGE

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TRADING WITH RUSSIA

REVISION of the embargo list whereby a large number of items for the Soviet Bloc and China is removed should offer UK manufacturers a real opportunity of extending their export trade. Until now the embargo has been based on two lists: one consisting of 181 items which is now reduced to 118; and the second of quotas on 25 items, which has now been abolished. The new embargo list (for details see p. 293) now consists entirely of strategic items for which no change is considered likely. An unpublished 'watching' list is still in being.

These substantial changes in the scope of the control of exports by the UK to the countries of the Soviet bloc (the embargo list applies to Albania, Bulgaria, China, Czechoslovakia, Hungary, North Korea, North Vietnam, Poland, Rumania, the Soviet Union, the Soviet zone of Germany and Tibet), follow a review of strategic controls by the 15-nation Consultative Group, consisting of the NATO countries, except for Iceland, with the addition of Japan. The US has not, however, modified its policy on trading with China. The goods now retained on the list are, as stated by the President of the Board of Trade, the 'bare bones' of a strategic list.

Reasons for the change have been obvious for some months. Visits to the Soviet bloc countries have revealed that certain goods on the embargo lists are being produced in these countries, and what is more, these goods have been offered in the world market. The belief, too, that western technology was generally superior has to a great extent been dispelled, as for instance, by the advanced state of the Russian's instrument industry. Indeed the UK Government has felt for some time that there were 'nonsenses on the list' which ought to come off.

The value of UK East/West trade reached £213 million in 1957, of which imports were worth £124 million (£73 million in 1950) and exports, including re-exports, £90 million (£35 million in 1950). Nevertheless, this trade in 1957 still accounted for less than 3 per cent of our total foreign trade, compared with about 7 per cent during the immediate pre-war years. Our trade with the USSR has shown the greatest increase in recent years (from a total of £48 million in 1950 to £122 million in 1957) and last year Anglo/Soviet trade accounted for more than half our East/West trade. At the same time, Anglo/Soviet trade has fluctuated considerably from year to year. Imports have not risen in value regularly each year although the trend since 1950 has been rising. Also, although UK direct exports have risen in each of the past three years, re-exports (almost entirely of raw rubber) have been subject to sharp fluctuations, reflecting the spasmodic timing of Soviet orders. Trade with other 'Eastern' countries has shown a less marked rise than Anglo/Soviet trade, and was subject to less violent fluctuations.

What are likely to be the effects of the revised list on trade prospects? The Board of Trade are reluctant to make any forecasts for foreign trade in China and Soviet bloc countries is in the hands of State monopolies and is conducted by them in accordance with predetermined plans. However, it can now be tested whether the various Communist Governments' previous protests that trade between them and the West has been hamstrung by the list are genuine or have been another piece of political propaganda.

IRIDIUM FOR CRUCIBLES

USEFULNESS of iridium as a material for crucibles in certain high temperature investigations is reported by Professor F. D. Richardson, Imperial College, London, (*Platinum Metals Review*, 1958 **2**, No. 3, 83). In the course of measurements of the thermodynamic properties of silicate melts containing lead oxide at Nuffield Research Group in Extraction Metallurgy, a container was required which was immune from attack by both molten lead and lead oxide at temperatures of 1,000° C to 1,500° C.

Although normal refractory oxide crucibles are satisfactory for holding lead at these temperatures, they are not resistant to attack by silicates containing large concentrations of lead oxide over long periods of time, i.e. 6 to 50 hours. Most refractory metals are either oxidised by lead oxide, e.g. molybdenum, or are too soluble in lead, e.g. platinum. However, in view of Sir William Crookes' report on boiling lead in an iridium crucible (*Proc. Roy Soc.*, 1912, **A86**, 461), tests were made using this metal, and it was confirmed that iridium was not oxidised by lead oxide (PbO) at any temperature. A black oxide of iridium formed when the metal was heated and then cooled in air, but this oxide required higher oxygen potentials for its formation than are associated with the system Pb + PbO at any temperature.

Assembly of iridium crucibles was carried out by Johnson Matthey and Co. Ltd. from sheet 0.012 inch thick (99.95 per cent purity), each crucible being welded. A crucible for holding PbO melts, and two smaller crucibles for holding lead, were enclosed in the main crucible. The whole assembly is reported as having kept its shape throughout many experiments. During use the crucibles lost weight slightly and became etched in appearance. Typical losses of iridium were 0.0002g. into 18g. lead in 444 hours at 1,000° C; 0.0014g. into 20g. slag and 20g. lead in 144 hours at 1,000° C. After continuous daily use for nearly a year the crucibles became slightly porous and brittle and from time to time were welded.

Tests were conducted to see if iridium could resist molten copper and iron. However, at 1,500° C to 1,600° C both these metals quickly attack iridium. As a container for slags at 1,500° C to 1,650° C iridium can hold calcium phosphates (23 to 45 mole per cent P_2O_5) at oxygen pressures of 10^{-6} to 10^{-7} atm. Also the eutectics of iridium with boron, phosphorus and silicon are well above those of platinum with this same series of elements.

Compared with platinum, iridium's lower reactivity towards a variety of elements suggests its potentialities as a special refractory for research and restricted industrial purposes. Also attractive are its physical properties, such as stiffness (as indicated by its extremely high modulus of elasticity) and creep. Strength at 1,000° C (assessed by measuring the stress needed to give 1 per cent deformation in 24 hours) was 6 tons per square inch compared with approximately 0.1 ton for platinum, 0.3 for palladium and 3 tons for rhodium. Only tungsten had a strength comparable with that of iridium, but this metal suffers from the disadvantage of being easily oxidised at high temperatures.

With regard to cost, iridium sheet costs three times as much as platinum and the working cost is also higher. But if allowance is made for the scrap value of the crucibles, the refractory bill is relatively small, and certainly considerably less than it would have been if alumina crucibles had been suitable; since two of these would have been required for each experiment.

RUSSIA'S PLASTICS INDUSTRY

RUSSIA is now far behind the US as a plastics producer, but she hopes to be in the lead by 1965. This statement is made in a report to the US State Department by Dr. Herman Monk, director of Polytechnic Institute of Brooklyn's Polymer Research Institute. Dr. Monk has recently returned from a tour of Soviet Laboratories as a guest of the Russian Academy of Science. He reports that US polymer production is outpacing that of Russia by a ratio of nearly 4 to 1. Russian polymer research appears to be of a high standard, and totals 30 to 40 per cent of US polymer research and development.

USSR polymer production is estimated at 1.1 billion lb./year as against the US's 4.5 billion lb./year. Mr. Khruschev is said to have declared that Russian plastics and synthetic resin products will increase eightfold by 1965—total of 9 billion lb./year, or 39 lb. per capita.

Polymer research under way appears to be concerned with mechanical properties of isotactic polypropylene and polystyrene and behaviour of block and graft polymers; synthesis of organic compounds containing silicon, boron, titanium, fluorine and phosphorus; and ferrocene-type compounds with the preparation of a series of omega-amino-carboxylic acids, by telomerised polymerisation of ethylene at high pressures, under the personal guidance of Professor A. Nesmijanov, president of the Russian Academy of Sciences. (One product is polyoenanthic acid amide, a nylon type material, which is being made on a pilot plant scale into continuous filament and staple fibre).

Polymers by a new principle—polymerisation through bifunctional recombination at moderate temperatures (thus eliminating complicating side reactions)—are also interesting. Diisopropyl ferrocene and diphenyl diisopropyl silicate have been polymerised in this way; the resulting products have high melting points and may be moulded, cast or spun. Linear polymers have been made by polymerising vinyl compounds with boron alkyl catalysts. Systematic studies on high pressure polymerisation of ethylene are being carried out and special attention is being given to the application of activated oxide catalysts. There is, too, great interest in tin organics such as trivinyl phenyl tin.

Several important points are made in the report: (1) all the laboratories visited possessed very modern equipment (electron microscopes, mass spectrographs, etc.) indicating a high level, large-scale precision instrument industry; (2) a centre of elastomer research and development, the Lebedev Institute of Synthetic Rubber Research, which compared with other institutions, is almost unique; (3) Russia has not caught up with polythene, polyvinyl, chloride and synthetic fibres (still in pilot-plant stage), although silicones and fluorocarbons are being produced.

Simultaneously with this report comes a brief note of a visit by an eight-man delegation from the US Society of Plastics Industry (in an interview with *Chemical Week*, 1958, **83**, No. 3, 26). Details of Russian plastics production gathered by this delegation from the Soviet Chemical Ministry show that last year phenolics and other tar-acid resins totalled 143.3 million lb.; epoxy and alkyd resins, 64.4 million lb.; silicones, 4.8 million lb.; urea and melamine resins, 118.6 million lb.; caprolactam nylon, 28.2 million lb.; fluorocarbon and related material, 44.1 million lb.; and thermoplastics, 133.4 million lb. Total plastics production in 1957 was 536.8 million lb. Product quality was described as uneven.

What of the question of selling plants and know-how to the Russians? The US plastics and chemical industry officials forming the delegation are reported as being divided in their views on this, some believing that more peaceful relations would be gained, with the goodwill gestures and generosity as good propaganda. Bargains in strategic or valuable materials may also be obtained.

UK TRADE WITH SOVIET BLOC

All Petrochemical Plant Freed from Embargo List

GOODS freed last week from the embargo on trade with the Soviet bloc and China include a wide range of chemicals, chemical plant and equipment and scientific instruments. The free list now includes all refinery and petrochemical plant, all equipment for the production of lubricants, most vacuum pumps; most compressors and blowers; spectrographs and spectrometers (except mass spectrographs and mass spectrometers); X-ray diffraction and electron diffraction equipment; electron microscopes; all forms of aluminium and copper; petroleum based lubricating oils and greases; glycols and their derivatives; and methyl methacrylate.

Among items still embargoed are certain high-performance equipment, some gas liquefying equipment; boron minerals and the metal if it contains 10 per cent or more boron; certain ferro-alloys; lithium; mercury; uranium; cobalt; tantalum; certain forms of beryllium, germanium, magnesium alloys, molybdenum, niobium titanium, thorium and zirconium. In the chemical section certain boron compounds are included with some compounds of rarer metals; a range of fluorinated hydrocarbons and silicone rubbers; fluorine; silicone fluids and greases and stabilisers for explosives; p.t.f.e., etc.

Until the necessary statutory orders have been revised, the Board of Trade will issue licences for those items no longer subject to control. A first order covering the simpler amendments to the current Export of Goods (Control) Orders will probably come into force early in September. A supplementary order will follow later.

Inquiries about the embargo should be sent to the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, London SW1 (Trafalgar 8855, Ext. 7843 or 2632). Copies of the list can be obtained from the Export Licensing Branch, 14 Bunhill Row, London EC1 (Monarch 4071), to which applications for export or transhipment licences should be sent.

The following is a summary from the revised list of goods subject to embargo; it includes a small number of additions which are marked with an asterisk.

GROUP B

Chemical and Metallurgical Plant, Compressors, Furnaces, Pumps, Valves, etc.

Centrifugal counter-current solvent extractors, continuous, designed to extract radioactive substances; centrifuges, with a peripheral speed of 1,000 ft per second or more, wholly made of or lined with aluminium, nickel or alloy containing 60 per cent or more nickel; and centrifugal bowls made of these materials.

Compressors and blowers, turbo, centrifugal and axial flow types, wholly made of or lined with aluminium, nickel or an alloy containing 60 per cent or more of nickel; multistage, with an overall compression ratio of 2:1 or more coupled with a capacity of over 372,000 c.f.p.m., or an overall compression ratio of 3:1 or more coupled with a capacity of 106,000 c.f.p.m.

* Containers, jacketted, mobile units of 500 gall. capacity or over, designed for storage or transport of liquefied gases; argon, helium, hydrogen, nitrogen, oxygen, ozone.

Electrolytic cells for the production of fluorine.

Equipment for the production or concentration of deuterium oxide.

Equipment specially designed for the conversion of *di*nitrogen tetroxide to nitric acid of 98 per cent or higher concentration or for the concentration of *di*nitrogen tetroxide or nitric oxides or mixtures thereof.

*Equipment specially designed: (a) for the purification and processing of germanium, other than equipment for zone purification; (b) for the purification and processing of silicon; (c) for the separation of isotopes of uranium.

*Furnaces, electric, specially designed for the recovery of titanium or zirconium from scrap.

Furnaces, vacuum, designed to operate at pressures lower than 0.1 mm. of mercury and at temperatures higher than 1100°C.

Gas liquefying equipment: for producing liquid fluorine; for the separation of helium from natural gases; equipment, n.e.s., specially designed for the production of gases in liquid form, capable of operating at pressures of 300 p.s.i.g. and over and producing one ton or more per day of gas in liquid form, other than:

Plants not capable of producing more than 25 per cent of their total daily product as extractable gas in liquid form.

Plants specially designed for liquefying chlorine and ammonia.

Stationary equipment for liquefying carbon dioxide.

Equipment for liquefying low molecular weight refinery gases.

Heat exchangers (tubular) and parts, other than aluminium tubing, designed to operate at pressures of 300 p.s.i.g. and above and having all parts in contact with the flow made of or lined with: aluminium, nickel, titanium, zirconium, or alloy containing 60 per cent or more nickel.

Pipe and tubing made of or lined with p.t.f.e. or polytrifluorochloroethylene.

Pipe valves, cocks and pressure regulators: (a) having all parts in contact with flow made of or lined with p.t.f.e., polytrifluorochloroethylene; or a material containing 90 per cent or more tantalum, titanium or zirconium; or 50 per cent or more cobalt or molybdenum; or (b) specially designed for operation at temperatures below −130°C.

Plant for the production of (a) military explosives and parts specially designed therefor, including nitrators, continuous types; (b) titanium metal (other than separate plant for titanium tetrachloride) and parts specially designed therefor; (c) zirconium metal (other than separate plant for zirconium tetrachloride) and parts specially designed therefor.

Pumps (other than vacuum pumps) capable of delivering liquids separately or in combination with solids or gases or solids and gases and, (a) designed to move molten metals by electromagnetic forces, or (b) with all parts in contact with the flow made of or lined with p.t.f.e., polytrifluorochloroethylene; or a material containing 90 per cent or more tantalum, titanium or zirconium; or 50 per cent or more cobalt or molybdenum; or (c) specially designed for operation at temperatures below −130°C.

Vacuum diffusion pumps having a liameter, measured inside the barrel at the inlet jet, of 12 in or greater, or capable of pumping speed in excess of 1,500 l. per second at a pressure of less than 0.001 mm. of mercury.

Valves, with bellows seal, wholly made of or lined with aluminium, nickel or alloy containing 60 per cent or more nickel, either manually or automatically operated.

GROUP D

Miscellaneous Goods and Machinery

Artificial graphite in the form of blocks or rods from which a cube of 2 in. side can be cut and having a boron content of 1 p.p.m. or less.

Crucibles, moulds and pouring rods composed of 97 per cent or more by weight of beryllium oxide, magnesium oxide or zirconium oxide or composed of zirconium oxide stabilised with calcium carbide or magnesium oxide or with calcium carbide and magnesium oxide.

GROUP F

Electronic Equipment including Communications and Radar

*Capacitors, tantalum electrolytic, not elsewhere specified.

Piezo-electric quartz crystals, blanks, plates, bars and rods, worked or unworked, mounted or unmounted.

Transistors and related devices (or related semiconductor amplifying devices such as fieldistors, spacistors and technetrons) and specialised parts therefor: (a) of any type using a basic semiconductor material other than germanium; and (b) having certain operating characteristics; (b) having any of the following characteristics:

GROUP G

Scientific Instruments and Apparatus, Servomechanisms and Photographic Equipment

Acceleration tubes and focusing tubes of the kinds used in mass spectrometers or mass spectrographs.

Balances of a sensitivity of 0.1 microgram or better.

Centrifugal testing apparatus with any of the following characteristics: (a) driven by a motor or motors having a total rated h.p. greater than 400; (b) capable of carrying a load of 250 lb. or more; (c) capable of exerting a centrifugal acceleration of 8 or more 'g' on a load of 200 lb. or more.

Control equipment, including certain control and torque type synchros; resolvers; amplifiers; linear induction potentiometers; induction rate generators; servo motors; potentiometers.

Cyclotron, belt-type electrostatic generators (Van de Graff machines), synchro-cyclotrons, betatrons, synchrotons, linear accelerators and other electronuclear machines capable of imparting energies greater than 1,000,000 electron volts to a nuclear particle or an ion; and magnets specially designed for such electronuclear machines.

Fluorimeters of the kinds in which u.v. light is used as the exciting source and photomultiplier tubes or photo-cells are used as the detecting or amplifying devices.

Ion microscopes having a resolving power better than 10 Angstrom units.

Ion separators, electro-magnetic, including mass spectrographs and mass spectrometers.

Leak-detecting instruments of the mass spectrometer type.

Magnetometers of the following types: (a) fluxgate; (b) electron beam sensing; (c) paramagnetic; (d) nucleonic; and parts specially designed therefor.

Measuring and counting apparatus, n.e.s., of certain descriptions.

Positive-ion sources suitable for use in cyclotrons, mass spectrometers and the like.

Radiation detection instruments and components, designed or capable of being adapted for the detection or measurement of nuclear radiation, the following:

Amplifiers designed for use in nuclear measurements, including linear amplifiers, pre-amplifiers and distributed chain amplifiers;

Coincidence units for use with Geiger-Muller or proportional counters;

Electroscopes and electrometers, including dosimeters other than (i) student types; (ii) simple metal leaf electroscopes; (iii) dosimeters specially designed for use with medical X-ray equipment; and (iv) electro-static measuring instruments;

Equipment, n.e.s., for health monitoring against radiation hazards, other than photographic film and equipment containing it;

Geiger-Muller counter tubes and proportional counters;

Instruments capable of measuring a current of less than one micromicroampere;

Ionisation chambers;
Ionisation measuring equipment suitable for the radiation survey of terrain and plant sites;
Neutron counters containing boron, boron trifluoride, or hydrogen;
Electron multiplier units activated by positive ions;
Quenching units for Geiger-Muller counters;
Resistors of resistance of not less than 1,000 megohms;
Scaling units and rate meters, suitable for use in radiation detection;
Scintillation counters incorporating a photomultiplier tube;
Scintillation counter phosphors, the following: single crystals and scintillation phosphors for use in radiation detection instruments, of volume greater than 1 c. in. (16 cu. cm.);
Valves (tubes), electrometer, designed to handle input currents less than 1 micro-microampere.

GROUP H

Metals, Minerals and Metal Manufactures

Boron element (metal), and alloys containing by weight 10 per cent or more of boron, in all forms; boron minerals, crude and refined.

Ferro-alloys whether briquetted or not; ferro-boron; ferro-niobium; ferro-niobium-tantalum; ferro-molybdenum; ferro-tantalum; ferro-uranium.

Fissionable materials: plutonium, uranium enriched in the isotope 233 or in the isotope 235, and materials artificially enriched by any of the foregoing.

Lithium metal; lithium ores and concentrates.

Magnetic materials in any form having:
(i) initial permeability 50,000 or over; or
(ii) remanance 98 per cent of maximum flux or over; or
(iii) a composition capable of an energy product (as measured when using a properly heat-treated test bar) greater than 6×10^6 gausses/oersteds, or containing more than 25 per cent cobalt; or
(iv) core loss of 0.45 watt per lb. when B equals 13,000 gausses at 50 cycles per second or less, for silicon steels; or when they are in the form of sheet or strip, a thickness of 0.0004 in. or less.

Mercury.

Metals in certain forms including cables, ropes and spirals, as follows:

Alloy steels containing by weight 50 per cent or more of iron or steel and one or more of the following: (a) 10 per cent or more of molybdenum; (b) 5 per cent or more of molybdenum and more than 14 per cent of chromium; (c) 6 per cent or more of cobalt, except permanent magnetic materials with a cobalt content of 25 per cent or less; (d) 1.5 per cent or more of niobium or tantalum; (e) 35 per cent or more of nickel; (f) 35 per cent or more of alloying elements (other than iron) one of which is nickel; (g) precipitation hardening steels containing 4 per cent or more of nickel.

Beryllium and alloys containing by weight more than 50 per cent of beryllium, other than windows for medical X-ray machines.

Cobalt (inc. scrap).

Germanium of a resistivity of 50 ohms per cm. or more.

Magnesium alloys containing by weight one or more of the following: (a) 0.4 per cent or more of zirconium; (b) 1.5 per cent or more of thorium; (c) 1.0 per cent or more of cerium mischmetall.

Molybdenum and alloys, n.e.s., containing by weight 20 per cent or more of molybdenum, except cleaned wire with a diameter not more than 500 microns and which, after being fully annealed, has an elongation factor not more than 5 per cent for diameters up to 200 microns and not more than 10 per cent for diameters from 200 to 500 microns.

Nickel based alloys containing by weight 32 per cent or more of nickel.

Niobium and alloys containing by weight 50 per cent or more of niobium.

Tantalum.

Titanium and alloys containing by weight 50 per cent or more of titanium.

Thorium and alloys containing by weight 1.5 per cent or more of thorium.

Uranium and alloys containing uranium.

Minerals, raw and treated, and residues, slag and tailings thereof, which contain by weight 0.05 per cent or more of uranium or thorium or any combination thereof, including: Carnotite, pitchblende and monazite sand and other ores containing uranium or thorium.

Ores and concentrates: Beryllium (other than gem grade beryl); cobalt (inc. residue and arsenical crystals); nickel (inc. primary residues and matte); niobium; tantalum.

Platinum clad molybdenum pipes and tubing.

Silicon of a purity of 99.9 per cent or more.

Woven wire mesh composed of wire containing 95 per cent or more of nickel and containing 60 or more wires per linear cm.

Zirconium metal and alloys containing by weight more than 50 per cent zirconium, in which the ratio of hafnium content to zirconium content is less than one part to 500 parts by weight, and manufactures wholly thereof.

GROUP I

Chemicals, Plastics and Synthetic Rubbers

Alkyl polysulphide liquid polymers (not water dispersions).

Boron compounds and mixtures, n.e.s., the following: boric acid and the ammonium, calcium, magnesium, potassium and sodium salts thereof, and esters of boric acid (but not perborates); boric oxide; boron trichloride and trifluoroide and their complexes; fluoroborates; other boron compounds and mixtures containing by weight an aggregate of 10 per cent or more of boron, whether in combined or elemental forms, but excluding: metal borates other than those specified above and perborates.

Bromine trifluoride.

Chlorine trifluoride.

Compounds of uranium or thorium other than medicinal preparations.

Compounds, the following: Beryllium, cobalt, other than paint driers, organic artificial colouring matters and paint pigments; germanium, having a resistivity of 50 ohms per centimetre or more; molybdenum disulphide, of a purity not less than 86 per cent; tantalum; zirconium in which the ratio of hafnium content to zirconium content is less than 1 part to 500 parts by weight.

Deuterium and compounds, mixtures and solutions containing deuterium, including heavy water and heavy paraffin, in which the ratio of deuterium atoms to hydrogen atoms exceeds 1:5,000 by number.

Diethylene triamine.

Fluorinated hydrocarbons: monochlorotrifluoromethane; dichloromonofluoromethane; monochlorodifluoromethane; trichlorotrifluoroethane; dichlorotetrafluoroethane; trichlorodifluoroethane; difluoroethane; monochlorodifluoroethane.

Fluorinated silicone rubbers and other fluorinated elastomeric materials, and such organic intermediates for their manufacture as contain 10 per cent or more of combined fluorine.

Fluorine.

Guanidine nitrate.

Hydrazine hydrate, unsymmetrical dimethyl hydrazine.

Hydrogen peroxide solutions containing by weight 50 per cent or more hydrogen peroxide.

Lead thiocyanate.

Lithium compounds.

Materials, suitable for use in refractories, composed of 97 per cent or more by weight of beryllium oxide, magnesium oxide or zirconium oxide, or composed of zirconium oxide stabilised with calcium carbide or magnesium oxide or calcium carbide and magnesium oxide.

Picric acid.

Sodium azide.

Silicone fluids and greases, the following: halogenated silicone fluids; lubricating greases capable of operating at temperatures of 180°C or higher and having a drop point to 220°C or higher.

Stabilisers for explosives, the following: ethyl and methyl centralites; diphenylamine; NN-diphenylurea; methyl-NN-diphenylurea; ethyl-NN-diphenylurea; ethyl phenyl urethane; diphenyl urethane; diortho tolyl-urethane; 2-nitrodiphenylamine; p-nitromethylaniline.

Tetrafluoroethylene, p.t.f.e., and manufactures wholly thereof.

Trifluorochloroethylene, polytrifluorochloroethylene and manufactures wholly thereof.

GROUP J

Petroleum Products, Lubricants and Hydraulic Fluids

High octane blending agents for aircraft fuels; alkylates, aviation grade; isopentane; neohexane.

Hydraulic fluids, petroleum based, having a kinematic viscosity of 4.6 centistokes or greater at 210°F (98.9°C) and a pour point of −30°F (−34.4°C) or lower and a viscosity index of 130 or higher.

Hydraulic fluids, synthetic, having a viscosity of not more than 4,000 centistokes at −65.2°F (−54°C) and not less than 1.5 centistokes at +302°F (+150°C).

Lubricating oils and greases, synthetic (ester type), being, or containing:
(a) Esters of dibasic asturated aliphatic acids combined with saturated aliphatic monohydric alcohols, where both of the two constituents contain six or more carbon atoms;
(b) Esters of dibasic saturated aliphatic acids combined with polyglycols, when one or both of the two constituents contain six or more carbon atoms;
(c) Fluoro-alcohol esters·
other than oils and greases containing not less than 50 per cent by weight of neutral castor oil or not less than 50 per cent by weight of castor oil and petroleum oil together.

GROUP K

Arms, Munitions, Military Equipment and Machinery etc. Specially Designed for their Production

Biological and chemical materials adapted for use in war to produce casualties in men or animals, or to damage crops; equipment specifically designed and intended (a) for their dissemination, and (b) for defence against such materials; and components and parts specially designed therefor.

Explosives as defined in Section 3 of the Explosives Act 1875. (Applications for licences to export explosives normally used for civilian purposes will be considered.)

South Africa to Supply Uranium Direct to UK

SOUTH AFRICAN Minister of Mines, Dr. van Rhizn, has announced that part of South Africa's uranium production will in future be supplied direct to Britain.

The Union's uranium production which last year totalled nearly £50 million, is expected to reach a new record this year. Supplies of uranium oxide to the Combined Development Agency, representing Britain, Canada and the US are being increased to 6,200 tons a year.

Contracts are shortly to be signed by Australia and Britain, which will provide for the sale of £A6 million worth of uranium concentrate from Australia's Northern Territory to the UK.

Agreement has also been reached by United Uranium and South Alligator Uranium (both of the Northern Territory) and the Commonwealth and UK Governments for the sale of a substantial quantity of uranium oxide at a 'good commercial price'.

SD To Design ICI's New Terephthalic Acid Unit

A NOVEL processing technique is to be utilised in the new 30 million lb. a year terephthalic acid plant that Scientific Design Co., 2 Park Avenue, New York 16, US, are to design for Imperial Chemical Industries Ltd. The new plant will about double present output and is part of the ICI programme to extend production of Terylene and Melinex.

Scientific Design will perform complete design and engineering service for ICI in the US with liaison services in the UK. ICI will construct the plant at their Wilton Works which SD say has a present total committed capital investment of nearly £120 million. The latest Terylene extensions, announced in September last year, will start operations in 1960 and will raise capacity to 50 million lb. a year.

The new plant, ICI's largest single terephthalic acid installation, will contribute to the company's constant search for new and cheaper routes for making chemical intermediates.

MORE PETROCHEMICAL ALCOHOL FOR DISTILLERS COMPANY

Four Fermentation Plants Closed

ENCOURAGING increases in sales of the various divisions of the industrial group of the Distillers Co. Ltd., in practically all divisions are reported by Sir Graham Hayman, chairman, in his statement. As a result of reorganisation, all chemical interests administered by the DCL group are co-ordinated and the products are sold by the Chemical Division.

Due to the continuing high cost of molasses, further diversion has occurred from fermentation of molasses as a source of industrial alcohol and other chemicals to production of these materials from petroleum. Four of the six fermentation plants have now been closed. The loss of earnings from the distilleries has been more than offset by DCL's share of the profits from Grangemouth it is stated. The petrochemicals manufacturing group is providing materials at economic cost and is sustaining the company's expanding production of chemical derivatives. More specialised and profitable demands have shown a steady increase in demand, but there has been some decline in export markets of older bulk lines due to new capacity in other countries. Carbon dioxide business has continued its steady growth, with more advantage being taken of bulk tanker deliveries. Calcium carbide output reached a record tonnage in production and sales.

Successful Year for BHC

British Hydrocarbon Chemicals (BHC) had a successful year. The second ethylene and ethyl alcohol plants have proved to be up to expectation and further expansion is being considered. Increased outputs and sales are also reported for Forth Chemicals (styrene) and Grange Chemicals (detergent alkylate).

Work on the high density polythene plant is up to schedule and it is hoped it will be in production early next year. BHC have begun construction of the cumene-phenol plant.

Chlorine production at Murgatroyd's Salt and Chemical Co. (equally owned by DCL and Fisons) was in advance of designed capacities.

Total antibiotics sales by the Biochemical Division rose by 33⅓ per cent. Prices obtainable were no higher, but lower production costs contributed substantially to the improved earnings. Research has led to the discovery of vitamin B12—peptide complex, stated to be an effective oral treatment for pernicious anaemia. The new product, Distivit Oral, was marketed on 1 July this year.

Satisfactory progress is recorded by the three major Plastics Division companies—British Resin Products, British Geon, and Distrene. New uses for synthetic resins and moulding pounders, polyvinyl products and Styron polystyrenes are being greatly facilitated by the Consumer Research laboratories and DCL's technical service team. The new plant for the manufacture of oil-resistant synthetic rubber and latices (Hycar products) has been brought into operation.

DCL's equally owned company with British Xylonite—BX Plastics—also had a record year of sales and profits.

Earnings of DCL's associate company, Magnesium Elektron, are well maintained, but sales have been hit by cuts in the Government's defence policy.

Trading results of the associated company in Australia, CSR Chemicals, continued to improve. However, the world-wide depression in demand for cellulose acetate flake, a CSR main product, has led to very low prices being quoted by overseas buyers; a Government bounty is now under review with regard to renewal.

The South African associated company, National Chemical Products, had a year of sustained growth, with higher earnings.

Useful progress is reported for research, development and enginering departments, particularly in the application of work study techniques in DCL's major plants. New laboratory construction has been authorised at the central research department at Epsom, and at the Hull and Carshalton establishments of the Chemical Division.

Some 425 qualified scientists and engineers are now employed by DCL in the various technical departments outside the production field. Annual appropriation for research and development, etc., now totals £1.75 million.

Joint Czech-Hungarian Conference on Polarography in Prague

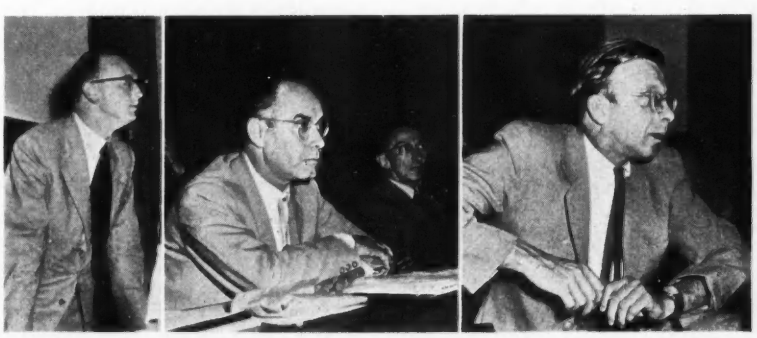
A FIVE-DAYS polarographic meeting entitled Second Czechoslovak-Hungarian polarographic conference was recently held at Purkyne Institute in Prague. The meeting was arranged by the Polarographic Institute of the Czechoslovak Academy of Sciences as a reciprocal meeting to that established between Hungarian and Czechoslovak polarographers in Veszprem, Hungary, in 1955.

Fifty-three delegates attended from Hungary, led by Professor Proszt in addition to guests from Poland, Bulgaria and East Germany. Professor Heyrovsky who opened the meeting welcomed Professor Semerano, head of the Polarographic Institute in Padua, Italy, and Dr. R. J. Magee, from the Queen's University in Belfast.

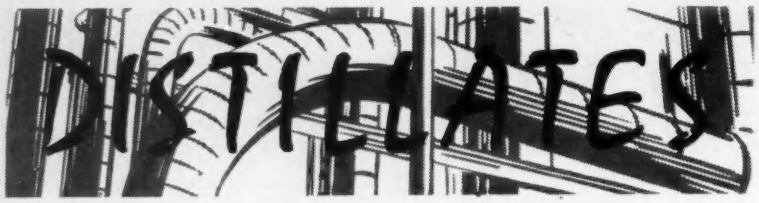
More than 60 scientific papers on theoretical, inorganic and biochemical polarography and on polarographic instrumentation were read and discussed during the first four days of the conference in two sections. The fifth day was devoted to educational questions and showings of the films 'Polarography' and 'Oscillographic Polarography', made by the Polarographic Institute of the Czechoslovak Academy of Sciences.

The conference which brought to the audience of more than 130 a survey of the most recent unpublished work done in Czechoslovakia and Hungary showed that polarography continues to show new ways of tackling problems in all branches of chemistry. Closing the conference, Professor Heyrovsky said that polarography had yet to make its maximum contributions, the number of publications on polarography being increased every year; the 1957 total was about 1,000.

Summaries of the papers read at the conference are available in German from: Polarographic Institute CSAV Praha III, Vlasská 9, Czechoslovakia.



At the Prague polarographic symposium, l. to r. Dr. R. J. Magee, Queen's University, Belfast; Professor G. Semerano, Padua; Professor J. Heyrovsky, Prague; and Dr. J. Koutecky, of the Physico-chemical Institute of the Czech Academy of Sciences



★ THE QUICKFIT GROUP of companies, which already export a large proportion of their output, expect that the fusing of the group with Joblings (see 'Commercial News', 16 August) will lead to a notable increase in overseas business. James A. Jobling and Co., makers of Pyrex glassware, have bought from Triplex Holdings the entire share capital of the group comprising Quickfit and Quartz, QVF and QVF Glastechnik, GmbH, Wiesbaden.

The new specialist organisation will be wholly devoted to serving the user of technical glassware. The association between Joblings and Quickfit, through their joint subsidiary, QVF, has shown the advantages to be gained in rationalisation of design, production and marketing.

In a joint statement, Mr. J. A. Cochrane, deputy chairman and managing director of Joblings and Mr. Brian H. Turpin, managing director of Quickfit and Quartz and QVF, state that the specialist skills formerly employed competitively will now blend to produce a marked improvement in the technical production of scientific glassware. I gather that the newly constituted Quickfit group will continue under the existing direction and management in the plants at Stone, Fenton, Stoke-on-Trent and Pallion, Sunderland.

★ THE FIRST of a new type of 'sausage skin' container will shortly be used to transport liquids made by the ICI's Heavy Organic Chemicals Division at Billingham. Known as Portolite, it is made of rubber and has a special protective coating on the inside. The container ordered for the division has a capacity of 4,000 gall., equivalent to about 14 tons.

This type of container has been developed by the Metals Division subsidiary Marston Excelsior of Wolverhampton and is based on the same principle as the flexible petrol tank evolved by the firm for aircraft during the war. When empty the Portolite lies flat on the floor of a lorry and is filled by the normal method used for tankers.

The container cannot be used for products held in liquid form under pressure. It should, however, make a useful contribution to transport economics for while a tanker has to return empty, the Portolite can be rolled up into a small space in a lorry which can then take a return load.

★ US BUREAU OF MINES research on ways of producing high-purity boron and determining its characteristics will, I understand, be accelerated during the 1959 fiscal year in efforts to provide more technical information to aid commercial production and increase utilisation of this important and versatile element.

During the current fiscal year, which began on 1 July, Bureau metallurgists at the Northwest Electrodevelopment Experiment Station, Albany, Ore., will continue their studies of methods of producing high-purity boron by reducing boron halides with an active metal, by fused salt electrolysis, and by electrolysis from organic baths.

Research on purification and processing of the experimental products will involve such methods as vacuum sintering, arc melting in inert atmospheres, electron bombardment, and controlled crystal growth. Physical, chemical, and electrical properties will be determined for all significant samples. Information regarding the Bureau's findings in boron research projects will, I am glad to learn, be made available in its series of technical publications.

★ A NEW method of protecting large populations in endemic areas from malaria incorporates anti-malarial drugs in domestic salt. This novel method has been investigated by the US Public Health Service at the request of the World Health Organisation.

In experiments carried out on volunteers at a US penitentiary, two drugs, chloroquine and pyrimethamine, were tested separately. The required amounts were calculated in relation to the salt consumption of the volunteers. Both substances are said to remain remarkably stable during storage and cooking and do not alter the taste or appearance of domestic salt.

This method is particularly attractive as in many places the species of mosquito that carry the malarial parasite are becoming resistant to DDT and other insecticides.

★ WHILE the epic Commonwealth Transarctic journey is now passing into history, overshadowed by more recent achievements of the *Nautilus*, many of its findings are only now being reported. One report that reaches my desk shows how the success or otherwise of advance planning is a vital factor in modern exploration.

In the expedition's race against the onset of the Antarctic winter the precautions against corrosion played a vital part. Inside each of the four Sno-cats was a transmitter, scientific equipment, spare parts, general stores and 150 lb. Sorbsil brand silica gel. The four Sno-cats were successfully protected against corrosion in transit by a plastics moisture vapour barrier and the presence of the 150 lb. Crosfield desiccant which proved sufficient to protect each Sno-Cat and its contents.

David Pratt, the expedition engineer, tells me that Sorbsil protection was so successful that the bags of desiccant, unloaded from the Sno-cats, were quickly appropriated by his colleagues for other protective jobs.

★ A NEW compound which when taken in tablet form, may enable man to resist double the dosage of radiation now held to be lethal has been developed in the laboratories at Oak Ridge. Much work has gone into this compound, which Dr. David Doherty and Mr. Raymond Shapira last week described at an international congress of radiation research in Vermont as the most promising product of related studies of the past few years.

Full toxic effects have yet to be ascertained. The compound, known as AET, is S.2-aminoethylisothiuronium bromide hydrobromide. It is claimed that 1 gm. could halve the damage to the average person's blood system from a radiation dose as high as 400 roentgens.

If further experiments are successful, the compound could be valuable in some aspects of cancer treatment. Injections of bone-marrow cells, which, administered after radiation—assuming the protective tablet had been taken—would more than double resistance against rays now accepted as lethal. The tablet would cost little more than aspirins.

★ AN INTERESTING installation at the zirconium plant of Mallory-Sharon Metals, Ashtabula, Oregon, US, transfers 2 million lb. a year of metallic sodium in 80,000 lb. lots from tankcar to process, via storage, without contaminating the metal or bringing it into contact with any outside material. The railroad car, containing solid sodium under argon, is run into a receiving shed some 50 ft. from the process building.

Adjoining the shed, are areas for oil storage, heating and pumping; sodium pumping, filtering and storage; and argon gas handling. Pipe lines that can be attached to the tank car for argon, oil and molten metal join the shed with the areas. Sodium metal is melted and heated to 250°F by hot oil pumped to the tankcar heating coils. Argon is forced into the car to push the molten metal up the sodium pipeline (heated by a.c. induction coils) from which it is pumped electromagnetically through filters to storage. Control of all variables is assured by complete instrumentation.

This advanced handling technique has been developed by US Industrial Chemicals Co., 99 Park Avenue, New York 16.

Alembic

STRUCTURE AND DRUG ACTIVITY—6

Activity in Antiseptics and Disinfectants

By
Peter Cooper
F.P.S., F.C.S.

ANY comparison of antibacterial properties must be limited to compounds of similar action and chemical nature, since there is no universal technique for comparing substances of widely different activity. Different organisms under different conditions show varied resistance to antiseptics, and a slight change in the molecule of a compound may increase its effect upon one organism but reduce its effect upon others. For example the chlorination of 3-methyl-5-ethylphenol intensifies its effect on staphylococci but weakens its action on *Pseudomonas pyocyanea*. For reasons such as this there will probably always be a call for a range of antiseptic drugs, each with its preferential activity. Moreover, specific conditions call for different antiseptics because their action is as a rule reversible within concentration limits and the environment of a micro-organism may often serve to neutralise one antiseptic but not another.

Hydroxyl groups are generally associated with antibacterial activity, in phenols, alcohols, glycols and carboxylic acids. Phenols exert an action upon micro-organisms which has been compared with narcosis in higher animals, and which has some connection with the power to denature proteins in living cells. Simple phenols are rendered more active by alkylation, arylation, nitration or halogenation. The alkyloxy and alkylthiol derivatives are stronger than the parent phenols. Solubility plays a major part in their activity, however, for poly-nitration or poly-halogenation markedly decreases water-solubility and so access to organisms. Alkyl phenols grow more potent with increase of molecular weight, up to five carbon atoms in the side-chain, and the hexyl compounds are still very useful antiseptics.

Lessening Potency

Primary substituents are more potent than secondary or tertiary ones. A second hydroxylic group lessens potency considerably; for instance, resorcinol is one third as active as phenol, 4-hexylresorcinol one third as active as 4-hexylphenol, judged by their phenol coefficients. Halogenation, despite its tendency to reduce solubility, lends potency in the order chloro-, bromo-, iodo-; the monohalogenated compounds being most useful. 2-Chloro-4-hexylphenol has double the phenol coefficient of 4-hexylphenol. The toxicity and irritant power of the compounds upon tissues decrease with further halogenation, probably because of the lessened solubility. The toxicity of the nitro-derivatives, however, tends to be high throughout.

Phenol itself is too irritant and toxic on absorption for widespread use; its value is mainly for external disinfection of linen and utensils. Alpha-naphthol is stronger and less toxic on tissue contact, while the beta-isomer is still more potent but irritant. The nitro-phenols in general, including nitrocresols, take on metabolic stimulant properties which render them dangerous. Trinitrophenol has enjoyed some vogue as a burn-dressing in the past, but its absorption produces toxic reactions.

Halo-substituents in the para position are more potent than those in the ortho position, and this fact is utilised in the halogenated cresol and xylenol series. The three cresols resulting from methylation of phenol are normally employed in combination, since their separation from coal-tar fractions is uneconomic. They are slightly less toxic than phenol and are effective in much greater dilution. Their low solubility in water necessitates their formulation with soaps or other surface-active agents. The meta-isomer is least toxic. Further methylation to xylenols decreases their antiseptic power and their solubility.

The 4-isopropyl derivatives of m-cresol is thymol, a mild antiseptic suitable for mucous membranes; it is one quarter as toxic as phenol, possibly on account of its low solubility. Its di-iodide has been used as an antiseptic dusting-powder. 6-Chlorination of thymol greatly increases its antiseptic power, but renders it intensely irritant. Carvacrol, the 1:2:4-isomer of thymol, has similar potency and toxicity.

The most successful derivatives of m-cresol and m-xylenol are the p-chloro compounds, which are both active antiseptics of low toxicity and irritancy, but rather low in solubility. The 2:4-dichloro derivative of m-xylenol is even more active. One chlorinated phenol, 2:2′ - methylene bis - 3:4:6 - trichlorophenol (hexachlorophene) can be formulated with soaps or as a dilute alcoholic solution of its disodium salt, and is particularly active against gram-positive organisms; its regular use in hand-washing soaps is said to confer an enduring skin-sterility, but this takes several days to become established. It has very low irritant properties. Hexamethylenebis-N′-(N-p-chlorophenyl-amidino) guanidine is virtually non-irritant and has a wide spectrum of activity against gram-positive and gram-negative organisms. This compound (chlorhexidine) is effective in high dilution, and its diacetate is soluble in water up to 2 per cent.

Among the dihydric phenols the m-compound (resorcinol) is least toxic and least irritant; the p-isomer (quinol) is more toxic than phenol, the o-isomer (catechol) even more toxic. Resorcinol is suitable for dermatological use, though its absorption causes depression of thyroid function; its monoacetate is less irritant and longer acting. Hexylresorcinol, a mild antiseptic of low toxicity, can be used in lozenges and aerosols, and can be taken internally as an anthelmintic. The methyl ether of catechol (guaiacol) is a rarely used intestinal antiseptic. Pyrogallol, the 1:2:3-triol of benzene, is toxic on absorption, though it has a limited use in dermatology; neither of its isomers is important medically, but the 1:3:5-compound (phloroglucinol) is the least toxic of the three. One anthracene derivative, the 1:8:9-triol (di-thranol) is very irritant, but is widely used to clear up resistant skin infections.

Germicidal Potency

Saturated aliphatic alcohols vary in germicidal potency, the general tendency being an increase of potency with increasing molecular weight. Unsaturated alcohols are too irritant to be of use as antiseptics. Secondary and tertiary alcohols are progressively weaker than their primary isomers. Polyhydric alcohols are only feeble antiseptics on application; propylene glycol and triethylene glycol, however, are potent in vapour form, and are only feebly toxic. Halogenation of the alcohols increases their antiseptic potency. The only important representative is trichloro-tert. butyl alcohol (chlorbutol) which is non-irritant and non-toxic, but suffers from undue volatility and instability in alkaline media. The introduction of aromatic groups confers useful properties. Phenylethanol is sufficiently non-irritating to be used to preserve eye-lotions; both it and phenoxyethanol are almost unique in having a marked action upon the troublesome organism *Pseudomonas pyocyanea*. They may be used in 0.5 and 2 per cent solutions respectively without damaging delicate mucous membranes. Phenylmethanol (benzyl alcohol) can be used as a preservative in injection solutions without danger; both it and its ethyl relative have the added advantage of being local anaesthetics.

In contrast with the alcohols, aldehydes of low molecular weight are more potent antiseptics than higher homologues. They are extremely irritant and quite unsuitable for living tissues. Formaldehyde is the only important member, and is powerfully germicidal towards all organisms in solution. Contact with formaldehyde may give rise to an intractable dermatitis, and its acute toxicity is high. Condensed with ammonia to give hexamine, however, formaldehyde has enjoyed some vogue as a urinary disinfectant, being liberated from hexamine in acid solution in the bladder.

Another class of antiseptics derives

from the affinity of certain dyes for bacterial protein. Azo-dyes are not markedly antiseptic, and have secondary actions such as causing cell-proliferation; unless well diluted they tend to be irritant. One azo-compound, 2:6-diamino-3-phenylazopyridine, has been used orally for disinfecting the urinary tract, but its efficacy is in some doubt.

The acridine dyes, however, provide valuable antiseptics, though they are irritant in high concentration and too toxic to be taken internally. They depend upon the acridine cation for their germicidal action, and only the highly ionised compounds are effective. Ionisation is achieved by amination at positions 2 or 5, the addition of a basic side-chain, or quaternisation of the cyclic nitrogen. Any variation from the planar form decreases their activity. Of the five mono-aminoacridines only two (2-amino- and 5-amino-) are potent antiseptics at neutral pH. The same rule applies to the diaminoacridines also, and to the methyl- and chloro-aminoacridines. Carboxylation, so that a zwitter ion appears, destroys their antiseptic properties, which are restored by esterification. Acridine cations are believed to compete with hydrogen ions for an anionic group vital to the organism. Proflavine (2:8-diaminoacridine), acriflavine (a mixture of this compound and 2:8-diamino-10-methylacridinium) and aminacrine (5-aminoacridine) are the accepted representatives of the acridine antiseptic series. Their activity is chiefly but not wholly against gram-positive organisms, and they are most effective in slightly alkaline medium.

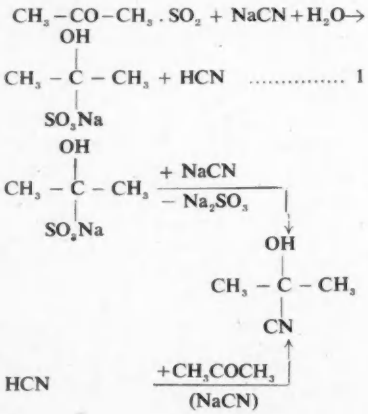
Cationic surface-active antiseptics are a relatively recent addition to the antiseptic armoury. They contain a hydrophobic group which is a paraffin chain, an alkyl benzene or naphthalene, joined to the active cationic group which is a hydrophilic quaternary ammonium, pyridinium, piperidinium, sulphonium, arsonium, phosphonium or iodonium group. The alkyl group usually contains 8 to 18 carbon atoms. Antiseptic concentrations of these compounds are non-staining, non-irritating to tissues, rapid-acting, penetrating and detergent. Systemic toxicity is low. The action of such compounds is unrelated to detergency or to protein denaturation, though all surface-active agents exert some action in depressing bacterial metabolism. Cationic antiseptics are active against a wide range of gram-positive and gram-negative organisms, though they are rather ineffective against fungi and viruses and against sporing organisms. They work in neutral or alkaline media, but are inhibited by acid media or anionic compounds. The activity of straight-chain quaternary ammonium compounds varies with the chain length; in the series $R\text{-}N{\equiv}(CH_3)_3$, there is a maximum effect with 16 carbon atoms. Arsonium is more powerful than phosphonium, which in turn is more powerful than ammonium. The anion has little effect upon the antiseptic power of the cation. It is among the cationic antiseptics that the scope for further research is probably widest.

Preparation of Acetone Cyanhydrin from Acetone and Sodium Cyanide

FROM East Germany, Vladimir Kabaivanov and Marin Michailov (*Chemische Technik*, 1958, p. 418) report the preparation of acetone cyanhydrin (d-oxyisobutyric acid nitrile) intermediate in methacrylate esters, e.g. Perspex. Improvements claimed for the process are: lower consumption of sulphurous acid (reduced to 0.5 mol on an average, compared with at least 1 mol of mineral acid or $NaHSO_3$ required for making 1 mol acetone cyanhydrin); an anhydrous product is obtained; no organic solvents are required for extraction as there is no aqueous phase; higher yield of product.

Acetone cyanhydrin can be prepared from acetone and alkali cyanides by two routes—by action of mineral acid on a mixture of acetone and a solution of alkali cyanide (1), or by action of a previously prepared acetone bisulphite on a solution of alkali cyanide (2).

Raschig (3) succeeded in making, by absorption of SO_2 in acetone, the compound $CH_3-CO-CH_3 . SO_2$ with $d_3 = 1.08$ which, after prolonged action of water, is converted into propanol-2-sulphonic-2-acid, and this, when treated with alkali solution, gives the corresponding bisulphite compound. With Raschig's work in mind, and also the fact that sulphurous acid is stronger than hydrocyanic acid (H_2SO_3 can displace HCN from its salts), these investigators considered it was possible to make acetone cyanhydrin by the reaction of $CH_3-CO-CH_3 . SO_2$, acetone and NaCN in the presence of water:



It was established that the reaction continues smoothly to the end if carried out below 25°C. The presence of 8 mol of water is required for each mol of $CH_3-CO-CH_3 . SO_2$, and not 1 mol of water as indicated in equation (1) (1 mol of by-product Na_2SO_3 formed absorbs 7 mol of water as water of crystallisation).

Working with a 20 to 30 per cent excess of acetone, the yield rises to over 95 per cent, in terms of NaCN, of what is theoretically possible. Excess acetone can be easily recovered by distillation of the product obtained. The acetone cyanhydrin, obtained in combination with $Na_2SO_3 . 7H_2O$, is best separated by acetone, it is reported, which can also be recovered.

The 95 per cent concentration of acetone cyanhydrin obtained can be used as the starting material for numerous syntheses. Successful synthesis of methyl methacrylate is reported, for instance.

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(2) Bucherer, H., and Lyrotée, A., *Berichte der Deutschen Chemischen Gesellshaft*, 1906, 39, 1225; DRP 141, 509; C. (1) 1244 (1903); (*Organic Syntheses* 1940, **20**, 43).
(3) Raschig, F., and Prahl, W., Liebe. Ann. Chem., 1926, **448**, 285.

Objections to US De-Salting Patent

A PATENT claim by an American firm for a process and apparatus for the de-salting of water is the subject of objections now being heard by the Patents Court in Pretoria, South Africa. The Transvaal and Orange Free State Chamber of Mines object to the grant of such a patent to Ionics Inc. of Cambridge, Mass, on the ground that the process and apparatus was known to employees of the National Chemical Research Laboratory of the CSIR in Pretoria, and that the invention is obvious.

Associated with the Chamber of Mines as an objector is the Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Ondersoek ten Behoewe van Nijverheid Handel en Verkeer of the Hague. This body may be described as the Dutch equivalent of the South African Council of Scientific and Industrial Research, and it has done much research work on de-salting water. Giving evidence for the objecting parties was Dr. S. G. Wieschers, who was formerly employed by the Dutch objectors, and who came to South Africa in 1953 to conduct research for the CSIR into the de-salting of water.

New Max Planck Route to Boron Alkyls

NEW method for making boron trialkyls from aluminium trialkyls is by means of the Zeigler-Koester process, developed by researchers at the Max Planck Institute for Coal Research, Mulheim/Ruhr.

In this process, trialkyl boroxoles are made from boron trioxide and boron trialkyl. The boroxoles then react with all three of the alkyl groups of the aluminium trialkyl, and boron trialkyls and aluminium oxide are formed. No fluorine or alcohol are required.

Using a simple two-slip process, the boron trialkyls can be converted to diborane in good yields. Significance of the process is understood to be still undetermined.

Overseas News

EASTMAN FLAME CRACKING PROCESS TO BE LICENSED OUTSIDE US

THE Eastman flame cracking process for the simultaneous production of acetylene and ethylene from light hydrocarbons will be available on a licence basis to manufacturers in the US. Necessary arrangements have been completed by Tennessee Eastman Co., a division of Eastman Kodak, in a contract with Stone and Webster of Boston, Mass. Under the contract, Stone and Webster will design and construct commercial plants.

A commercial size unit of Eastman design has been operated successfully for several months by Chemische Werke Huls. Plant design by Stone and Webster will be based on the Huls experience and the results of Eastman research and development.

Work in this field has been carried on for many years at Tennessee Eastman's research laboratories. In developing the process, a new type of cracking furnace was devised and yields of more than 50 per cent by weight of products from the raw material fed to the furnaces were obtained.

The Eastman process can use various light hydrocarbon feed stocks such as liquefied petroleum gases and natural gasolines. Eastman also plan to license their flame cracking process outside the US. When the necessary arrangements have been completed, Stone and Webster are expected to represent the company in its foreign licensing programme.

UCB's Tie-up With Brazilian Chemical Company

Union Chimique Belge have announced that, together with the Brazilian chemical company of Produtos Quimicos Elekeiroz SA, they have formed a new company, registered in Brazil and trading under the name of Ucebel Produtos Quimicos SA. This company, which will have its headquarters in Sao Paulo, will be responsible for the production and sale of products of the Belgian company, which has as yet had no licences granted it to trade with Brazil.

Pay Rise for West German Chemical Workers

After prolonged negotiations during which the old wages agreement expired and the German chemical industry for three months carried on without a wages agreement in force, it has now been arranged that the old official rates are to be increased with retrospective effect from 1 May by DM 0.18-0.21 an hour, i.e., 11-12 per cent. In fact wage rates above the official ones have been paid in most chemical works in the Federal Republic, quite apart from piece-rates and other special payments, so that the new wages will be only 7½-8 per cent above the old level. The new agreement is to run for 15 months in the first instance and can be terminated first on 30 September 1959.

US Titanium Producer Joins With German DEW

Continental Metals Corporation (Contimet) has been formed by Titanium Metals Corporation, US, with Deutsche Edelstahlwerke (DEW) of Germany. Headquarters of Contimet will be in Luxembourg. The new company will melt ingot and produce titanium mill shapes in the main at DEW's plant in Krefeld, West Germany.

Contimet are to carry out research to develop titanium products for Europe's chemical processing and petrochemical industries.

Israel Carbide for Export

Mayer Chemical Industries Ltd. will erect in Petal-Tikva, near Tel Aviv, a I£1.2 million plant to produce calcium carbide, having an annual capacity of 10,000 tons.

A standard electrothermal process will be employed as also indigenous burnt lime. Coal, however, will have to be imported.

Israel's home demands for calcium carbide are estimated at 3,000 tons a year. Some 7,000 tons of carbide will therefore be available for export.

NSW Polythene Plant Saves £2 m. a Year Imports

Output from Australia's first polythene factory, opened last December in New South Wales, saved that country about £A2 million in overseas funds. Present production rate of ICI Australia and New Zealand is 5,000 tons a year, and is due to be increased next month to supply all Australia's polythene needs. Further expansion is planned to keep pace with expected market growth. The factory uses sugar-based alcohol as a raw material.

Japanese Bid For New Pakistani Fertiliser Plant

The Pakistan Industrial Development Corporation and Kobe Steel Works of Japan have signed an agreement for setting up a fertiliser plant at Fenchuganj in the northern area of East Pakistan. Completion is scheduled for July 1961 and foreign exchange to the extent of US $2½ million will be needed.

The factory will be based on natural gas from Sylhet and is expected to produce 106,560 long tons of concentrated urea. In terms of standard fertilisers, production will be 250,000 tons a year.

Synthetic Rubber Prices Down in N. America

The Polymer Corporation of Canada have dropped the price for GRS-type synthetic rubber by 0.85 cents to 23.25 cents per lb, f.o.b. Sarnia. The leading sellers of synthetic rubber in the US have also reduced prices of GR-S from 24.10 cents to 23.25 cents per lb.—the same reduction—f.o.b. New Orleans. The Canadian company bases its decision on growing competition in the synthetic rubber market.

W. Germans May Sponsor Chemical Industry in Egypt

A delegation of German businessmen is reported to be discussing with the authorities in Cairo detailed plans for the development of the chemical and oil industries in the United Arab Republic. According to a statement made by the UAR, certain projects in the chemical industry are to be carried out with long-term loans from Western Germany, though no particular instances have yet been stated. The Soviet Union is also said to be ready to finance further industrial projects in the UAR.

New Chilean Nitrate Deposits To Be Worked

The Government of Chile has decreed the transfer to the Cia. Salitrera de Tarapaca y Antofagasta of two grants of land in the Province of Tarapaca for the operation of nitrate deposits. One field, in Soronal, extends to nearly a million sq. metres and is estimated to contain 350,000 tons of nitrate of which 97 per cent is sodium nitrate. The other field is of 12.5 million sq. metres containing about 850,000 tons of nitrate. A third decree transfers 3.3 million sq. metres of land containing 88,000 tons to the firm Luis Urruticoechea. These concessions are for 10 years and operators will pay 1 per cent on the f.a.s. value of the nitrate exported.

Franco-German Plant For Polymer Emulsions

A factory to produce polymer emulsions on the basis of monomeric acrylic esters is to be built at Villiers St. Paul, France, as the joint enterprise of Badische Analin und Soda-Fabrik and Compagnie Française des Matieres Colourantes. CFMC are to provide the site and BASF the plant design and operational know-how.

NRC's Tantalum Plans

Major expansion at the Cambridge (Massachussetts) plant are planned by National Research Corporation US, to accommodate large scale production (30,000 lb. a year) of high purity tantalum, suitable for the electronics industry,

After two years' of research, NRC have perfected a new process for large scale reduction of tantalite ore to high purity tantalum metal powder. A new type of vacuum arc-melting furnace to convert the tantalum powder to large high-density ingots has also been developed by NRC.

The tantalum obtained is described as having a low oxygen content (30 p.p.m.), low carbon content (20 p.p.m.) and having a low content of impurities which adversely affect melting and fabrication while the high purity gives unusual ductility and low hardness (60 to 65 Brinell). It is stated that the metal can be reduced from a 3 in. diameter ingot to a 0.0005 in. foil without intermediate annealing.

Montecatini's Agreement For Persian PVC Plant

Montecatini Chemical Group has reached an agreement with the American Development and Resources Corporation regarding the building of a petrochemical plant in Persia. The Persian Government awarded the contract to the Montecatini company. The plant in question will produce plastics materials and polyvinyl chloride.

Second French Uranium Concentrates Plant Operating

France's second uranium concentrates production plant is now in operation, the Atomic Energy Commission have announced. The plant is situated at Bessines, near Limoges, and has an initial capacity of 200,000 tons of ore a year. This capacity is expected to rise to 600,000 tons by the end of next year. France's first plant went into operation in July last year at Ecanpiere, near Clisson, Western France, and will have a capacity of 300,000 tons by October.

Canada Expects To Sell More To UK

Canadian chemical industry officials have expressed great satisfaction at the removal by the UK of almost all import restrictions on chemicals from dollar areas. It is expected that the action will offer new opportunities for Canadian manufacturers and it is understood that Britain is looking particularly for vinyl resins and fertilisers. There are also expected to be sales possibilities for caustic chlorine and for a range of organic compounds based on oil.

Petrochemical Expansion by Française de Raffinage

In 1957, the Française de Raffinage company expanded petrochemical production at their two refineries, at Gronfreville, Normandy and La Mede, Provence, where new plants have either been installed or existing plant has been enlarged.

At the Gronfreville refinery a desulphurising plant with a capacity of 100,000 cu. ft. in a day and a fractionating plant for separation of propylene-polymers have been installed. The latter has a throughput of 758 barrels a day. This expansion will enable propylene tetramer (basic material for dedecylbenzol) and also propylene trimer (for plasticisers) to be supplied.

Française de Raffinage will also be able to supply substantial quantities of isobutylene by the last quarter of 1958 and ethylene by the middle of 1959.

US Chemical Firms Plan Expansion in Australia

Plans to spend £1,355,000 on expansion are reported by Australian subsidiaries of three large US chemical companies. Abbott Laboratories Pty, will build a £555,000 factory in Sydney; Warner Lambert, a £500,000 factory at Villawood, and Pfizer Pty, a £300,000 plant at Ermington. All three factories will manufacture and package pharmaceutical products and chemicals.

Australia and the South Pacific areas will be supplied by Warner-Lambert and the Australian and Far Eastern markets will be supplied by Pfizer.

New Bayer Glycol Process Via Long-Chain Aliphatic Acids

Production of glycols from long-chain aliphatic acids, eg, adipic, pinetic and sebacic acid, is simple using the new Farbenfabriken Bayer process. Excess of already formed glycol is used to esterify the acid at 250°C. Water formed during this reaction is removed by means of an inert gas stream. Towards the end of the reaction the pressure is reduced to remove the last traces of water. Use of sulphuric acid-toluene mixture is thus avoided.

Using a copper-chromium catalyst the diester formed is reduced by hydrogen at 100 to 300 atmospheres and 150 to 250°C. The primary yield obtained amounts to 90 per cent glycol and 10 per cent higher esters. The latter are returned to the reduction process and a final total yield of 99 per cent (based on initial acid) is obtained.

Commercial Quantities of Vinyl Stearate Produced

Two million lb. of vinyl stearate will be produced at Air Reduction's new plant at Calvert City, Kentucky. This is the first US plant to produce vinyl stearate in commercial quantities.

The production of vinyl stearate is effected through Airco's process which utilises acetylene and stearic acid. Outlets considered of promise for the stearate are in the making of synthetic waxes, including aerosol waxes.

Wide Range of Chemicals From Bayer's Brazilian Plant

The new factory of Bayer's Brazilian subsidiary, Bayer do Brasil Industria Quimica SA, at Belfort Roxo, Rio de Janeiro, is now in operation. Production range includes aniline dyes, chemicals for the paper, textile and leather industries and some basic pharmaceuticals, as well as insecticides, weed killers and other chemical products hitherto imported.

Addition to Dow's Separan Range

An addition to the Separan range (see CHEMICAL AGE, 26 July p. 155) of Dow Chemical International Ltd., Midland, Michigan, US, has been made. Separan NP20 is proclaimed to be the most active flocculating material available on a unit weight basis. 'Less material may be used or the same amount of material will provide more flocculating activity in a given application,' the announcement states. The new material is a synthetic, organic, water-soluble high molecular weight polymer and is manufactured as a white amorphous flake. Commercial quantities are available for the overseas market.

Cerium as High Purity Metal

HIGH-PURITY cerium metal, which may assist in the development of 'super alloys' is now being produced experimentally at Bureau of Mines laboratories in Reno, Nevada, US. Almost totally free of iron, carbon and hydrogen, the metal made at Reno attracts and absorbs impurities that enter other metals when they are molten. Thus, it is hoped that it will be useful in producing other metals in purer form. These, in turn, would be blended to make new and stronger alloys that can withstand the high temperatures encountered in rocket and missile applications.

Electrical conductivity of high purity cerium (an indicator of purity), is over three times as high as that of the commercial variety, it is reported. The metal has such a high affinity for other elements it must be made in a specially designed air-tight apparatus under a shielding blanket of inert gas, such as helium. At present, it takes eight hours to produce a single pound of the pure cerium in a small electrolytic cell. This so-called 'dry box' was designed and built by Bureau scientists and is similar to one the Bureau developed for welding titanium metal.

As the high-purity cerium is both difficult and costly to obtain, relatively few uses have been developed for it to date. However, it is believed that it will ultimately make possible alloys suitable for fabricating electronic and automation devices. In addition, it may find a use as a flame-sprayed coating for metals and alloys used in making nose cones and other rocket and missile parts that are subject to intense heating by air friction. Such a coating tends to reflect heat and protect the parts from corrosion, making them less likely to burn up at high speeds.

EQUIPMENT REVIEW

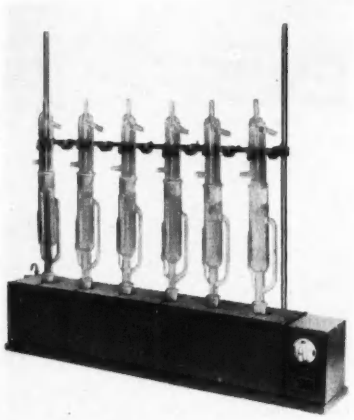
Chemical Plant : Laboratory Apparatus : Safety and Anti-Corrosion Products

WATER BATHS IN STAINLESS STEEL

SMOOTH FINISH stainless steel is now being used by A. Gallemkamp and Co. Ltd., Sun Street, London EC2, for the construction of their range of water baths. Two general purpose baths and a bath for Soxhlet extractions have already been modified, but retain their original dimensions and features.

Heating is by tubular immersion elements and each bath is equipped with a safety head to protect the element should the water be allowed to evaporate. Temperature control for the Soxhlet bath is obtained by a 3-heat switch for a.c. and d.c. supplies, or an energy regulator in the model for a.c. only.

The general purpose baths have six or 12 holes, 3⅛ in. diameter in the top cover,



6-test Soxhlet extraction bath in stainless steel

each hole being fitted with a set of stainless steel rings. An energy regulator is available for use on a.c. supplies. The Soxhlet bath is suitable for six assemblies of glassware and takes flasks up to 500 ml. capacity; condensers are held by spring clips fitted to an adjustable horizontal rod carried by two vertical 24 in. long duralumin rods.

NEW PAINT RESISTANT TO CHEMICALS

DETEL E/P paint, formulated on an epoxy-pitch combination, has been developed by Detel Products, Ltd., Victoria Park Estate, South Ruislip, Middx, as a coating of exceptional thickness combined with good resistance to chemicals, oils, fats and general corrosive conditions. To the water resistance and thicker film of a pitch coating is added increased chemical resistance and hardness of epichlorhydrin resins.

Being thixotropic, the material is easy to apply and a thickness of 0.010 in. can be built up with two coats. Detel E/P paint is said to produce a good finish, is tough, flexible, and can be either brush or spray applied to metal or concrete.

It is suitable for use on permanent structures such as bridges, as a lining for tanks and tankers, and in particular for mechanical handling equipment which may be dealing with abrasive dusts. Coverage of the paint is approximately 250 sq. in. to the gallon when a coating of 0.005 in. thickness is applied. A greater coverage can be obtained by applying thinner coats. For the most severe conditions, two coats, each of 0.005 in. are recommended.

The paint is sent out in two components which must be mixed in the proportions given in the instructions sent with the containers. Cost is 65s. per gall., but for orders of 25 gall. and over, the price is 62s. 6d. per gall.

CHLORINATED RUBBER PAINTS

A NEW range of chlorinated rubber paints under the name Avigel 250, has been introduced by Corrosion Ltd., Southampton. A long-term research programme to eliminate 'cob-webbing', the picking up of previous coats by follow-on-coats, and other difficulties has been undertaken and it is stated that the new material will be found as easy to use as oil paints, while at the same time retaining full chemical and water resistance.

Avigel 250 has been formulated with a drying time fast enough to give the most economical application, but slow enough to provide a wet edge for joining up where work has been temporarily left off for a meal interval, etc. In addition, special types have been introduced for application to wet surfaces (Avigel 250 wet) and also with fungus-resisting properties (Avigel 250 FR) for use where mould and fungus growth create problems.

NEUTROSTAT AIR GUN HAS LAB USES

A NEW addition to the range of anti-static devices supplied by Sheridan Croxted Ltd., 296-302 High Holborn, London WC2, is known as the Neutrostat air gun. Designed specially for the removal of static attracted dust, it is similar in size and shape to any normal air gun. The Neutrostat will simultaneously blow off dirt and neutralise static charges on both the dirt and the article being cleaned.

Prototype Neutrostat air gun in use on plastics vessel

Its main advantage apart from ensuring the article is clean and completely destaticised is that it considerably reduces the man-power and time needed for such cleaning operations. A number of guns can be energised from the same power supply, and any compressor developing up to 50 p.s.i. is suitable for the air supply.

Some typical applications for this equipment are in the neutralising and cleaning of small slides, lenses, etc., in the laboratory, lenses and optical surfaces before packaging, vials and containers before filling, Masonite wallboard after sanding and many surfaces before varnishing or painting.

It is expected that the nozzle part of the gun can be utilised for many other purposes such as the elimination of static in otherwise inaccessible positions, such as are encountered in feed piles.

BARFLO EXPANSION UNIT

THE BARFLO expansion unit has been designed by Barflo Ltd., Cavendish Place, Eastbourne, to overcome expansion difficulties met when plastics pipe is to be

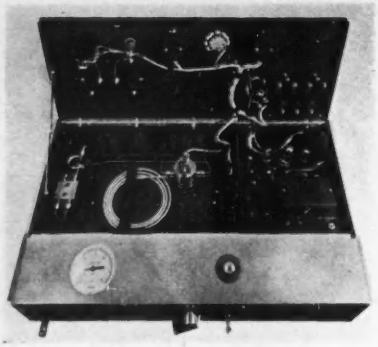
Barflo compression joint for plastics piping

installed and particularly where rapid changes of temperature occur. The unit is suitable for all sizes of plastic pipe and can be constructed to take up to 12 in. expansion.

Standard units are supplied in Durapipe K in six sizes from 1 in. BS to 6 in. BS with 6 in. expansion. Alternative materials and sizes can be supplied.

BECKMAN GC-2 GAS CHROMATOGRAPH

THE Beckman model GC-2 gas chromatograph, available from the official agents for Beckman Instruments Inc., Baird and Tatlock (London) Ltd., Freshwater Road, Chadwell Heath, Essex, is a versatile instrument that can handle gases and liquids with boiling points up to 350°C.



GC-2 gas chromatograph

Reproducibility is ±0.1 per cent. Features of this new model include proportional temperature control, assuring quantitative accuracy and precise identification of compounds; conduction heating, which means more analyses per day; improved flow regulation, eliminating spurious pressure surges and random peaks; an advanced sampling system which simplifies introduction of a wide variety of samples; complete a.c. operation; and engineered sensitivity which makes possible trace analysis of components in the very low p.p.m. ranges.

An exclusive seven-position automatic temperature control system covers the range from 40° to 225°C, enabling the handling of gases and liquids with boiling points up to 350°. A booster heating element brings the column and associated tubing up to operating temperature in a few minutes. Column temperature will equilibrate in 10 minutes after a 30° increase has been made. An electronic eye helps the operator anticipate temperature equilibrium.

Precise control of the carrier gas and the sample flow is enabled by a combination of an internal regulator and a dual capillary orifice system which ensures that normal pressure surges resulting from sample introduction do not appear in the detector cell. Flow rates are controlled to 0.5 c.c per minute; a normal range of from 10 to 200 c.c. per minute is available and higher rates can be obtained by replacing the capillary with a shorter unit.

Carrier gases that may be used with the GC-2 include hydrogen, helium, carbon dioxide, nitrogen and argon. Precise sample introduction equipment is provided for both liquids and gases; a stainless-steel helium-leak-checked sampling valve is fitted as standard as is a special septum which is used for syringe type injection of gases or liquids.

TABLETTER FOR POWDERED METALS

THE Manesty DB24 rotary tablet machine is a new addition to the range of machines now being produced by Manesty Machines Ltd., Speke, Liverpool 19. The DB24 has been brought out in response to the numerous requests for a machine with a large depth of fill, making it ideal for the powdered metals and ceramics industries where a relatively high compression ratio is required to produce the components. The upper and lower rolls are fully adjustable making it possible to produce shouldered components within the capacity of the machine.

The material to be compressed is fed from a stainless steel hopper into a specially designed feed frame which ensures a complete and even fill of the die, the hopper is adjustable both vertically and horizontally enabling the flow of powder to be carefully regulated, a dust extractor is fitted at the pressure point. The cam track is designed to give the maximum possible lead on the ejection and lowering cams thus giving increased punch life and exerting less pressure on the component at the point of ejection. The adjustments for weight of component and pressure can be made while the machine is running, if so desired.

Of rugged design with turret made of high quality meehanite, ball bearing backshaft with phosphor bronze worm, all cams are made of aluminium bronze and pressure rolls of high quality steel, easily removable stainless steel chute, adjustable motor platform, and ammeter fitted to starter for standard a.c. supplies. Hydraulic pressure indicator device is fitted as standard to the lower roll overload mechanism and when correctly adjusted will indicate the total pressure exerted on the component being made.

AIR-PRESSURISED ELECTRICAL SYSTEM

THE PRINCIPLE of pressurisation, by air or an inert gas, of an electrical installation run in conduit has frequently been suggested for use in hazardous areas (such as hydrogen) for which no flameproof equipment is approved. Pressurisation by itself, however, is open to the objection that the installation would be unsafe if pressure were lost for any reason.

These difficulties are overcome for hydrogen atmospheres in the GEC air-pressurised electrical system by the use of an intrinsically safe control circuit, in which are included one or more pressure switches; this control circuit, being intrinsically safe in hydrogen, can remain energised whether air pressure is present or not. The intrinsically safe circuit in turn operates, by a relay system, a contactor housed in a control unit outside the hydrogen area.

The Factory Inspectorate has recently issued a general approval of the system where there may be risk from any of the vapours or gases in the pentane, ethylene and hydrogen classes.

Any mains-operated electrical equipment which is suitable for pressurisation at ½ p.s.i. or more can be operated in the above atmospheres by means of the pressurised system. This includes motors, for totally-enclosed machines can be adapted readily by suitable gaskets for running under pressure. The opening of the contacts of any pressure switch due to a loss of pressure in the system results in the tripping of the mains contactor, and it is also impossible to energise the operating coil of the contactor to switch on the mains supply unless the system is correctly pressurised. On the other hand, the control circuit, being intrinsically safe, can remain energised irrespective of whether pressure is present or not throughout the installation.

The intrinsically safe transformer, mains contactor and contactor control relay are housed in a control unit which is supplied either in a form suitable for installation in a 'safe' area adjacent to a hydrogen area, or in certified flameproof form. The control unit for 'safe' areas is fitted with indicator lamps showing when the mains supply is on and the system is safely pressurised.

Pushbutton on/off switches are available for the local control of lighting inside the hydrogen areas. Lighting installations would normally be divided between at least two control units so that in the event of pressure being lost in one system, the lights connected to the other would continue to operate. The equipment supplied by the General Electric Co. Ltd., Magnet House, Kingsway, London WC2, includes complete air control panels, but the air supply itself is taken from the works compressed air lines through a reducing valve or, for lower pressures (below about ½ p.s.i.) from a blower.

MARK VIII DUST RESPIRATOR

THE Mark VIII dust respirator produced by Siebe, Gorman and Co. Ltd., Davis Road, Chessington, Surrey, consists of a moulded rubber facepiece, designed to give a comfortable airtight fit on all shapes of faces. To the front is attached a moulded plastics filter holder. The low-resistance non-return outlet valve is situated at the bottom of the facepiece between the chin and the back of the filter holder and is so positioned that any condensed moisture which may accumulate is discharged to atmosphere when the wearer exhales. The inlet valve is fitted centrally on the inside of the filter holder.

Mark VIII dust respirator by Siebe, Gorman

This respirator is slightly more efficient than the Microfilter and Mk. IV respirators and is supplied in two sizes—normal and small. A departure from the Micro-

filter is the more effective method of containing the filtering medium. This is done by fitting the resin impregnated merino wood filter into a sealed metal cartridge in the front of which are circular perforated holes. A cotton-wool pre-filter is provided, which is placed in front of the filter cartridge, thus preventing the ingress of larger dust particles and prolonging the life of the cartridge. It is essential, therefore, that the pre-filter be changed at regular intervals dependent on conditions of use. The pre-filter is held in a flanged and perforated metal container in the front of which is fitted a special stiffened disc of open-weave fabric. Both the cartridge and pre-filter can be easily and quickly changed, by unscrewing the moulded plastics ring which contains them in the filter holder.

The complete respirator is held in position on the face by an elastic harness consisting of four adjustable elastic bands, two of which pass over the ears and two below.

DOULTON BALL MILL

Figure C. 401 porcelain ball mill by Doulton Industrial Porcelains Ltd., Tamworth (See CA., 12 July, p. 71 for description.)

HAREFIELD FLEXIBLE RUBBER DOORS MANY improvements have been made in the latest version of the Harefield flexible rubber doors; produced by Superbuilt Products Ltd., Bell Works, Harefield, Middx. These include the fitting of a new patented hinge mounted at the top of the door to reduce possible damage to a minimum.

Other features are a framework of bright mild steel; only two hinge units to each pair of doors; hinge units can be removed for servicing by undoing four bolts; doors can be left open without danger of overtensioning the springs, by disengaging the retaining arms; the spring, which acts in compression, can be adjusted by a $\frac{1}{4}$ in. Whitworth nut; all working parts are case-hardened; a $\frac{1}{8}$ in. diameter ball fitted to the base of each door acts as a pivot bearing and reduces friction to a minimum.

NEW MUREX POWDER FLUXES UNDER the generic name of 'Muraflux', Murex Welding Processes Ltd., Waltham Cross, Herts, are producing a group of new powder fluxes for submerged arc welding. Muraflux A is the first of these new fluxes, and it has been specially developed to meet the need for a high-quality general-purpose flux for the submerged-arc welding of mild steel. It can be used on either a.c. or d.c. supplies with welding currents up to 900 amp. and on all machines suitable for submerged-arc welding.

The flux may be employed with a mild-steel filler wire containing approximately 2 per cent manganese or with a normal mild-steel wire. Both types of wire, known as Murawire W1 and Murawire W2 respectively, can be supplied. When used with Murawire, Muraflux A produces good-quality welds of a high radiographic standard, and it can be employed for Class 1 work.

Muraflux A is suitable for either the single-pass or multi-pass welding of various joints in mild steel, as well as plug welds and the building up of worn mild steel parts. Good penetration can be obtained, and unfused flux can be recovered and used again.

UNION BONNET VALVES A NEW range of high pressure bronze stop valves, available in sizes $\frac{1}{2}$ in to 2 in. inclusive, has been introduced by Meynell and Sons Ltd., Montrose Street, Wolverhampton. The most up-to-date principles of modern valve design have been employed and the new range caters for a wide variety of applications and service conditions.

The three basic types of valve are: Metal-to-metal clack and seats, suitable for 250 p.s.i. saturated steam; also for 500 p.s.i. cold water, oil, gas, etc (non shock). Clack with renewable composition disc, suitable for 200 p.s.i. saturated steam, and for 400 p.s.i. cold water, oil, gas, etc. (non shock).

A renewable p.t.f.e. (Fluon) disc and nickel alloy seat suitable for particularly aggressive service conditions are available for screwed or flanged mountings.

This new range of union bonnet valves complies with British Standard 2060; valves with screwed ends can also be supplied to US standards.

NEW MILD STEEL ELECTRODE A NEW iron powder electrode for the welding of mild steel, known as Ferrolux, has been introduced by Quasi-Arc Ltd., Bilston, Staffs, and is designed for high speed welding in the flat and horizontal-vertical positions.

Using a touch-welding technique, the electrode can be drawn out to make long, smooth fillet welds. The fillet shape is mitre with a neat ripple. Slag detachability is good and the electrode is of value to operators on production work where high output and good weld profile is required.

To ensure instantaneous arc starting, Ferrolux are lightly tipped at the striking end with a special composition during manufacture. They are fully extruded and are made in 18 in. (457 mm.) lengths in sizes from 10 s.w.g. to $\frac{1}{4}$ in. diameter (3.25 to 6.35 mm.).

UK Riker Laboratories Introduce New Psychic Energiser

DESCRIBED as an important advance in the chemical control of human tensions is 'Deaner', a new drug marketed by Riker Laboratories Ltd., Loughborough, Leics. Technically, the drug is para-acetamidobenzoic acid salt of 2-dimethylamino ethanol.

Extensive investigations on this new preparation have been carried out by Dr. Carl Pfeiffer, director of the Division of Basic Healths Sciences and Professor of Pharmacology, at Emory University, Atlanta, Georgia, US.

Deaner, which is already in use in the US, is undergoing clinical trials in the UK. It will be marketed in tablet form in the autumn.

Indications for the drug are the treatment of chronic fatigue, mild depression and migraine. Maximum effectiveness is attained after two weeks to a month. The drug will be available on prescription only.

Deaner was developed as a result of a search for a means of producing more constant acetylcholine (Ach) effects on the brain. Ach is formed in the peripheral nervous system and at these sites aids the transmission of electrical impulses between nerve fibres or from nerve fibre to effector cell. There is evidence also that Ach is active in the functioning of certain areas of the brain.

Pfeiffer deemed it worthwhile to attempt to develop a means of exerting a cholinergic (Ach-like) effect on the brain and to observe in animals and human beings the effects on behaviour.

The search centred on finding a substance which would penetrate the blood-brain barriers with relative ease and, in the brain, be converted either to Ach or some similar substance with an effect on brain function. The search led to 2-dimethylaminoethanol (DMAE, deanol or 'Deaner base').

In favour of the view that DMAE is converted within the brain to Ach or some similar substance is the finding that radioactivity labelled Deaner has been shown to get into the brain and the labelled carbon to be present in the expected fraction of brain.

Deaner is rapidly absorbed and widely distributed. Soon after absorption it has been found in muscle and liver. Part of the drug is converted to choline. The radioactive labelled carbon is found in the brain and is excreted in the urine and exhaled air much more slowly than is the similarly labelled carbon of administered choline. Much of the compound enters into the metabolic 'pool' and is 'lost' in the constituents of the body.

It cannot yet be answered, in terms of chemical reactions or detailed physiologic mechanisms, how this new drug acts.

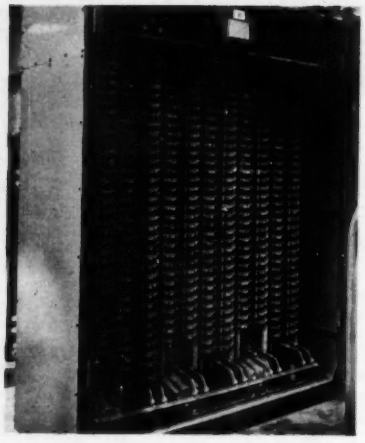
Riker Laboratories Ltd. is the British affiliate of Riker Laboratories Inc., Los Angeles, US, a wholly owned subsidiary of the Rexall Drug Co., US. The company in England was established in 1957.

GERMANIUM RECTIFIER FOR GLAMORGAN ACID AND ALKALI

GERMANIUM diodes are incorporated in a new 23,000-amp rectifier installed at the works of the Glamorgan Acid and Alkali Co. by the Westinghouse Brake and Signal Co. Ltd., York Way, King's Cross, London N1. The equipment is used for the rectification of current for the electrolysis of brine to produce chlorine which, as hydrochloric acid, is required for the manufacture of high grade gelatine. The ultimate capacity of the rectifier is 3 megawatts.

The rectifier is water cooled, the cooling circuit being electrically insulated from the d.c. circuit, thereby eliminating problems that might otherwise arise from leakage currents due to low insulation resistance. Water cooling ensures that the operating temperature of the germanium diodes is well within safe limits; furthermore the even temperature of the banks of germanium diodes aids even distribution of current among them, so very little derating of the diodes is required to avoid the overloading of those which have particularly good characteristics.

It is claimed that the use of germanium diodes in high efficiency, compact layout



offers the most economic power conversion equipment both as regards first cost and power consumption. The reliability of germanium for this purpose is now well proven.

BNS Plan New £10 Million Nylon Plant in Hampshire

PLANS to build a new £10 million nylon factory in the Leigh Park, Havant (Portsmouth) area of Hampshire are reported by British Nylon Spinners, jointly owned by Courtaulds and Imperial Chemical Industries Ltd. Application for the necessary industrial development certificate has been made to the Board of Trade.

The proposed plant will involve a capital outlay of over £10 million, would cover about 100 acres. About 2,000 people would be employed.

British Nylon Spinners state that the site selected after consideration of various suitable sites all over the country, fully meets the requirements of the industry. The Havant area not only has a pool of skilled labour but also clean air and good communications.

The move is supported by the three Members of Parliament for the Portsmouth area constituencies. The final decision as to whether this project can go ahead now rests with the Board of Trade. If the necessary certificates are granted, BNS will proceed to build the plant as soon as it possibly can. It would be about two years before the plant would be in production, it is stated.

This new plant would be BNS's third major plant. The other two are at Pontypool and Doncaster. Nylon yarn for clothing and industrial purposes would be produced.

£13,000 Granted by Instrument Fund to Develop X-ray Technique

GRANTS worth £13,285 for the development of X-ray techniques in analysis have been made by the Paul Instrument Fund Committee. The committee comprises representatives of the Royal Society, the Physical Society, the Institute of Physics and the Institution of Electrical Engineers.

Dr. V. E. Cosslett, university physics lecturer at Cambridge, receives £11,000 for the further development and improvement of the X-ray microscope by extending the resolution beyond that of the optical microscope and by attaching an automatic recording mechanism for quantitative analysis of elements.

Professor J. D. McGee, professor of instrument technology, Imperial College, has been awarded £2,000 to enable him to construct a television system for X-ray image intensification.

Dr. J. W. Jeffery, physics lecturer, Birkbeck College, London, has been granted £285 so that he can carry out crystal structure determination by X-ray diffraction using an instrument for 1-dimensional Fourier syntheses employing dekatron counting apparatus.

Chemical Prices Fell Slightly in June

WHOLESALE price index of the Board of Trade shows a slight fall in prices of the chemical and allied industries in July. First part of the following table deals with commodities produced in the UK, the second part with goods wholly or mainly imported. The indices, representing monthly averages, are based on 1950 1954 = 100.

	July 1957	June 1958	July 1958
Chemical and allied industries:			
Total sales	106.1	104.6*	104.2*
Home market sales ...	106.3	105.8*	105.2*
Dyes and dyestuffs ...	111.0	110.4	110.4
Disinfectants	112.4	112.9	112.9*
Fertilisers	113.8	120.4	113.1
Insecticides, weedkillers and fungicides	99.9	92.9	92.9
Synthetic resins and plastics materials ...	94.5	94.6	94.5*
General chemicals ...	108.0	107.8	107.2*
Benzole, pure, BSS136-1950	106 9	106.9	106.9
Caustic soda liquor, 100° Tw	112.8	116.3	116.3
Soda ash, light (delivered)	112.4	115.3	115.3
Soda ash, light, f.o.r. works	114.2	117.7	117.7
Sulphuric acid, B.O.V.	114.4	103.9	102.2
Sulphuric acid, R.O.V., 94-95 per cent ...	108.8	104.5†	99.4
Drugs and pharmaceuticals	98.7	98.0	97.6*
Synthetic detergents ...	101.4	103.1	103.1
Ethyl alcohol, industrial BSS507—1933 ...	164.4	146.2	146.2
Commodities Wholly or Partly Imported			
Pyrites, c.i.f. UK ports ...	101.1	72.7	78.2
Sulphur, crude (for acid making), c.i.f.	102.5	83.5	80.0

* Estimated. † Revised.

New Regulation Permits Preservatives etc. in Citrus Fruit

BY THE Public Health (Preservatives etc. in Food) (Amendment) Regulations 1958 the importation and sale of citrus fruit which contain diphenyl or ortho-phenylphenol or admixtures of the two substances within prescribed limits is permitted. This is provided that the fruit has been wrapped outside the UK in wrappers impregnated with diphenyl to the extent of not more than 40 milligrammes per 100 square inches. Impregnation of the container with diphenyl or the inclusion of impregnated pads or spacers in the container constitute a technical breach of the regulations.

The Preservatives Sub-Committee of the Food Standards Committee have recommended the presence in citrus fruit of not more than 100 parts per million of diphenyl or not more than 70 parts per million of ortho-phenylphenol or admixture of the two provided the sum of the quantity of each when calculated as a percentage of the permissible maximum in each case does not exceed 100.

Unilever Negotiations with Emery Industries Inc.

Following the completion of a survey of West European markets, it is reported that Unilever NV and Emery Industries Inc., of Cincinatti, US (producers of acetate and derivatives) have entered into negotiations for the formation of a joint venture for the manufacture and sale of a number of oleo-chemical derivatives in Europe.

PEOPLE in the news

● DR. W. R. MOORE, senior lecturer in physical chemistry at the Department of Chemistry and Dyeing, Bradford Institute of Technology, has been appointed reader in high polymer chemistry. Much of the institute's research in physical chemistry has been concerned with high polymers, particularly cellulose derivatives, and both post-advanced and post-graduate courses in the subject have been developed.

● MR. P. N. HERON, M.A. (Cantab), formerly a research chemist with Monsanto Chemicals, is now in charge of the day-to-day packaging inquiries and short-term tests at PATRA.

● DR. R. L. M. SYNGE, a Nobel prize-winner in chemistry, has been released from his work at the Rowett Research Institute in Aberdeen to spend a year at the Ruakura animal research station to help in research into facial eczema among sheep. As a goodwill gesture to New Zealand his salary will be paid by the Scottish Department of Agriculture. Four other UK scientists will complete the team which arrives in New Zealand in November; they will be at Ruakura for three to five years under New Zealand Government research fellowships.

● MR. R. E. NEWELL, managing director of the ICI Wilton Council, recently flew to Rome to advise on the establishment of a nuclear power station in southern Italy. One of the two UK members of a special panel set up by the World Bank (the other is DR. J. M. HILL of the Atomic Energy Authority), Mr. Newell is one of this country's experts on the construction of atomic power projects. During the war, he was lent by ICI to take charge of the engineering division of the Canadian atomic project at Chalk River. Returning to Wilton in 1946, he became a consultant to the Atomic Energy Research Establishment at Harwell on possible power developments.

● DR. A. M. COOK, senior lecturer in pharmaceutics at the School of Pharmacy, London University, has been appointed to the university readership in pharmaceutics tenable at that school.

● MR. W. H. BANKS, superintendent of research at PATRA, has been appointed an examiner for the City and Guilds of London Institute in the application of science in printing.

● PROFESSOR P. V. DANCKWERTS, G.C., professor of chemical engineering science at Imperial College, London, is from 18-26 August lecturing in Mexico on some of the aims and achievements of the UK in the field of atomic energy. His visit, sponsored by the British Council, includes lectures in Mexico City to the National University on 'Some chemical engineering problems of atomic energy', and to the Atomic Commission on 'Industrial reseach and development in the UK Atomic Energy Authority'. Professor Danckwerts, formerly deputy director of research and development, AEA Industrial Group, has been in Venezuela, lecturing to company staff at the invitation of Shell Petroleum. Earlier this year he had given the British Council assistance in planning the visit to the UK of a party of Mexican deans of engineering faculties and heads of departments. To follow up these contacts and to enable him to make others in a wider scientific field, the British Council has invited Professor Danckwerts to spend a week in Mexico before returning home.

● MR. W. M. FRAMES, formerly chairman of Rand Mines Ltd., has been named chairman of the International Nickel Co. SA (Pty.) Ltd., South African subsidiary of the International Nickel Co. of Canada. Mr. Frames will be chief executive officer of the South African subsidiary, which is engaged in mineral exploration and investment. The company is opening new offices in the Palace Buildings, Pritchard Street, Johannesburg.

● MR. STANLEY FIELD, a former managing director of the Prestige Group and director of Ekco Products of Chicago, has been appointed chairman of Vanesta Ltd. Mr. Field, who is 44, became deputy chairman last February and now succeeds MR. HENRY RUTHERFORD. In recognition of his 50 years of service, Mr. Rutherford has been appointed the company's first hon. president.

Visitors to Sunvic's Harlow Factory

More than 60 visitors from France and leading industrial concerns in the UK visited the Harlow factory of Sunvic Controls Ltd. to see the first completed units for the data handling system being supplied by the company for the UKAEA uranium diffusion plant at Capenhurst. The equipment will continuously and automatically scan more than 2,000 points at which are measured the temperatures of the uranium hexafluoride, glands, pump motor bearings and cooling water as well as motor currents and voltages.

11th OCCA Exhibition

Preliminary arrangements for the Oil and Colour Chemists' Association's Eleventh Technical Exhibition, 1959, have now been completed. The venue will once again be the New Hall of the Royal Horticultural Society at Greycoat and Elverton Streets, London SW1. The exhibition will take place on 17, 18 and 19 March 1959.

Market Reports

TRADING CONDITIONS NOW MORE ACTIVE

LONDON Rather more active trading conditions have been reported for the general run of industrial chemicals. The subdued tone which has prevailed in recent weeks has given way to a broadening of interest with many of the home consuming industries looking beyond their immediate needs.

The routine soda products and potash chemicals have been moving well against contracts, and there has been a good inquiry for materials for the plastics and paint industries. Prices generally are unchanged and steady. The flow of export inquiry has been reasonably good in the face of keen competition.

Among the tar products pitch and phenol crystals are in steady request, and both crude and refined tar are moving well.

MANCHESTER Holiday stoppages has been less in evidence and trading conditions on the Manchester heavy chemicals market have improved. On the whole, existing commitments for the alkalis and other leading lines are being drawn against reasonably well on home-trade account, though the position in this respect so far as the textile trades are concerned is much the same as before. A fair export movement continues. Fresh bookings in fertiliser materials are largely confined to early delivery transactions in those sections where rebates are available, and it is likely to be some weeks yet before there is a general recovery from the seasonal dullness.

GLASGOW A more or less return to normal business can be reported during the past week from the Scottish heavy chemical market. Although there are still some areas affected by the holiday period, the position was one of increased activity. Demands were for nominal requirements and quantities were well maintained.

The price position showed little change, and most prices have remained firm. Some interest is still being shown in regard to agricultural chemicals.

Commercial News

- British Tar Report Higher Trade Volume
- DCL Sales Top £200 Million for First Time
- Offer for Anglo-French Now Unconditional
- Four Nations Sponsor Alumina Project

Ashe Chemical Ltd

An extraordinary meeting of Ashe Chemical has been called for 11 September to alter the company's articles and empower the board, for a limited period, to sell holdings of less than 50 shares on behalf of holders, in view of various problems arising from such holdings. In giving four weeks' notice of the meeting, it is pointed out, holders who wish to make their own disposal arrangements, or to increase their holding to 50 shares or more, are afforded the opportunity.

British Tar Products Ltd.

As a result of additions to the BTP works and those still to be made, the book value of certain fixed assets is stated to be 'completely out of proportion to the very much higher current market value of these assets. An independent valuation made in 1957 on a basis of replacement has disclosed a figure of about £750,000 as compared with the relative book value of £182,059.' This is stated by the chairman, Mr. F. Woolley-Hart, in his annual review of British Tar Products Ltd.

Trading profit of the company was £126,966, an increase of £20,368 over the previous year. The volume of trade also increased. Payment of a final dividend of 17½ per cent less tax, with the higher interim dividend paid in January last, makes a total dividend distribution of 27½ per cent less tax. In addition, a capital bonus of 5 per cent free of tax is being paid. Total reserves and undistributed profits amount to £344,657, and it is proposed that £163,122 10s should be capitalised and distributed by way of a 100 per cent share bonus.

Benzole Producers Ltd. continue to function, but their operations are now considerably limited.

In the manufacturing section purchases of semi-refined products for treatment at the company's rectifying plants are continuing to be developed.

Distillers Co. Ltd.

A higher volume of sales in nearly all sections of the Distillers Co. is reported by the chairman, Sir Graham Hayman, for the year to 31 March last. However, in a number of cases, profit margins were reduced on account of competitive conditions which prevailed. At the same time, the total value of consolidated sales for the first time exceeded £200 million, an increase of 3½ per cent over the previous year.

The respective proportions of total earnings between Scotch whisky and gin and DCL's industrial activities at 75 and 25 per cent have not materially changed from the previous year.

Profit from trading after charging depreciation is £22,681,751, compared with £21,432,602 last year. Income from investments totals £1,517,734, compared with £1,259,306 last year, and includes a dividend from British Hydrocarbon Chemicals Ltd. of £935,000 for the year to 30 April 1957.

Appropriation for taxation for the year is £12,527,172. Net profit of the group after eliminating the proportion attributable to outside shareholders in certain subsidiary companies, is £10,582,818 compared with £9,817,587 last year.

A final dividend on the ordinary share capital at the rate of 10d per share of 6s 8d is declared, making 1s 4d for the year, or 20 per cent, compared with 18¼ per cent last year.

During the current year, the board propose to examine the capital structure of the group with a view to bringing the issued share capital more into line with the total funds employed in the business. Forward needs of the company to finance projected capital expenditure over the next few years will be reviewed to ensure that any additional capital required can, if necessary, be taken into account in deciding upon the form of capitalisation to be adopted.

Outstanding commitments for capital expenditure amount to approximately £814,000 for DCL and £1,890,000 for the group.

Anglo-French Phosphate

Robert Benson, Lonsdale and Co. state that acceptances of their offer for the capital of the Anglo-French Phosphate Co. total 72 per cent. The offer is now unconditional and payment has been made to accepting shareholders at 15s 3d per share. The offer is extended to 3 September, after which date no further acceptances will be considered.

Canadian Industries

Canadian Industries Ltd. and subsidiaries net profit for the first six months of this year amounted to $3,303,000, equal to 37 cents per share of common, compared with $5,073,000 or 58 cents a share common in same period of last year. Consolidated sales totalled $74 million, down 1.6 per cent from the 1957 figure of $75,200,000.

Polythene sales in the domestic market continued to expand and sales of chemicals the processing of uranium ores were substantially greater. Development of the Canadian market for Terylene continued, but at a lower rate and exports to supplement supplies for the British market have recently been substantially curtailed. In addition to lower demand, profits were also reduced by starting up charges of new production facilities and the large research and marketing expenses incurred to improve the company's competitive position.

New plans for the production of ammonia, hydrogen peroxide, sulphuric acid and nitric acid are all in operation. The first granulation unit has been completed at the Chatham, Ontario, fertiliser plant and units at Hamilton and Ingersoll will be completed before the end of the year.

FRIA Compagnie

A new international corporation to develop the vast bauxite deposits in French West Africa and to produce alumina there is known as FRIA Compagnie Internationale pour la Production de l'Alumine. The group comprises the Olin Mathieson Chemical Corporation, US; Pechiney and Ugine of France; Aluminium Industrie of Zurich; and the British Aluminium Co. Ltd. Percentages of ownership are: Olin Mathieson, 53½ per cent; Pechiney and Ugine, 26½ per cent; Aluminium Industrie, 10 per cent; British Aluminium, 10 per cent. FRIA shareholders will have the right to purchase alumina in proportion to their holdings.

Estimated cost of the project is $135 million. The FRIA plant is now being constructed and it will be operated by Pechiney. Initial capacity is 480,000 tons of alumina a year, with expansion potential of up to 1,200,000 tons a year.

US Borax and Chemical

Gross profits of the United States Borax and Chemical Corporation (controlled by Borax (Holdings) Ltd.) for the three months to 30 June 1958, amounted to $4,274,661, compared with $4,256,365 in the corresponding quarter a year ago. Net income was $891,692, however, against $1,253,214. Consolidated net sales for the three months amounted to $14,455,695 ($12,855,863).

National Chemical Products

National Chemical Products, Pty. Ltd., Cape Town, South Africa, in which company the Distillers Co. own a substantial holding, achieved a record group profit of £360,000 against £305,130 in the year to 31 March 1958. The dividend is maintained at 2s 6d per share.

Fertilisers and Chemicals

Israel's chemical combine and the country's largest manufacturing company, Fertilisers and Chemicals, report a 50 per cent increase in sales in 1957-58 as compared with the preceding year. This increase in sales has been accompanied by a rise in net profits from 10.4 per cent to 16.6 per cent, after allowing for depreciation at full rate—mainly as a result of higher output stemming from higher productivity and production increases beyond capacity.

Company Meeting

THE DISTILLERS COMPANY LIMITED

THE 81st Annual General Meeting of The Distillers Company Limited will be held in the North British Hotel, Edinburgh, on Friday the 12th day of September, 1958, at 12.30 p.m. The following are excerpts from the statement by the Chairman, Sir Graham Hayman, which has been circulated with the Report and Accounts for the year ended 31st March, 1958.

ACCOUNTS

The profit from trading after charging depreciation is £22,681,751, compared with £21,432,602 last year. The increased profit of the Group is mainly attributable to the continuing expansion in sales of our Scotch Whisky companies, but there has been a marked growth in the earnings of our Industrial associated companies, which arises from the heavy investment programme in recent years, and dividends from these sources are included under Trade Investments. Our income from Trade Investments totals £1,517,734 compared with £1,259,306 last year, and includes a dividend from British Hydrocarbon Chemicals Limited of £935,000 for the year to 30th April, 1957.

After eliminating the proportion of net profit attributable to outside shareholders in certain subsidiary companies, the net profit of the Group is £10,582,818 compared with £9,817,587 last year. Your Directors consider that the results justify an increase in the total dividend to be paid for the year. Shareholders will recall that the interim dividend was altered from $4^4/_5$d. per share to 6d. per share to reduce the disparity between the interim and final dividends. Your Directors now recommend that a final dividend on the Ordinary Share capital be declared at the rate of 10d. per share of 6s. 8d. making 1s. 4d. for the year, or 20 per cent compared with $18\frac{3}{4}$ per cent last year. They also propose to transfer £1,500,000 to General Reserve, which will leave the amount to be carried forward practically unchanged at £2,364,363.

SCOTCH WHISKY

Our distilling operations for the season were carried out under favourable conditions, with production at a somewhat higher level than in the previous year. The erection of new Warehouses and the modernisation of Distilleries and Bonding and Blending establishments, involving as it does a heavy outlay of capital expenditure, marks continued progress and brings with it the attainment of greater efficiency.

Stocks of Scotch Whisky held by the Industry as at 31st March, 1958, reached the impressive total of 219m. proof gallons, being an increase of 20m. proof gallons on the corresponding figure for last year.

Although your Board considers that the Company's own production is reasonably related to prospective sales, there is evidence of a speculative element in the market which is undesirable and gives rise to some concern.

So far as exports are concerned, the United States still remains the predominant market of the Industry, taking as it does more than 50 per cent of the total.

It is clear that in a general sense we are undoubtedly approaching much more competitive conditions. However, your Company's policy during the difficult post-war years of unsatisfied demand has been to maintain the high quality and distinctive character of its brands, even though this inevitably curtailed our opportunities for increased sales. As and when conditions of free supply return, we may expect consumers to be even more discriminating than in recent years. I am therefore confident that your Company, with its known adherence to established standards of quality, is well equipped to meet the more difficult market conditions which lie ahead.

GIN

Our Gin Group plays an important part in our over-all economy, and makes a significant contribution to the country's export trade. The total sales of our Gin Companies continued at a high level and, with the exception of the U.S.A., both home and overseas markets showed satisfactory increases. It is undoubtedly true that competition, both at home and abroad, has become more keen, but your Companies' brands have an established position and are generally well received.

INDUSTRIAL GROUP

Sales of the various Divisions showed encouraging increases in practically all sections during the year, although world trading conditions became less favourable during the latter part, and there was evidence of increased competition. At the present time, the markets for some of our products could be described as hesitant, and while so far there has been no major setback, the immediate outlook is somewhat uncertain.

CHEMICAL DIVISION. Further reorganisation has taken place during the year, so that all chemical interests administered by the Group are co-ordinated and the products are sold by the Chemical Division of the Distillers Company, instead of by separate companies.

Due to the continuing high cost of molasses, an important feature of the past year has been the further diversion from fermentation of molasses as a source of industrial alcohol and other chemicals, to the production of these materials from petroleum. Of our six large fermentation plants, four have now been closed. This change was foreseen when we initiated our petroleum chemicals development at Grangemouth, and the loss of earnings from the distilleries has been more than off-set by our share of the profits from Grangemouth. A more fundamental consideration is that our petroleum chemical manufacturing group affords us materials at an economic cost which, in turn, sustains our expanding production of chemical derivatives.

The sales pattern showed a steady increase in the demand for the more specialised and profitable chemicals, with some falling off, particularly in export markets, of the older bulk lines, due to the establishment of new capacity in other countries.

Our carbon dioxide business continued its steady annual growth, with large consumers taking more and more advantage of the bulk tanker method of delivery which was pioneered by your Company, and which represents the most economic form of delivery of this versatile product.

Calcium carbide output from our plant in South Wales reached a record tonnage in production and sales.

BRITISH HYDROCARBON CHEMICALS LIMITED, GRANGEMOUTH. This Company, in which we are equal partners with The British Petroleum Company Limited, had a very successful year. A full year's output from the second ethylene and ethyl alcohol plants has shown these to be in every way up to expectation and further expansion is under consideration. Other plants at Grangemouth, including those of Forth Chemicals Limited (Styrene) and Grange Chemicals Limited (Detergent Alkylate), also enjoyed increased outputs and sales.

Last year it was reported that a plant for the production of a new type of high density polyethlene was under construction. This work is up to schedule and it is hoped to commence production early in 1959. The product will be sold by our Plastics Division under the trade-mark "RIGIDEX". Meantime, market testing carried out with imported material indicates much interest in this new plastic. Its outstanding properties are rigidity, resistance to high temperatures, and toughness.

During the year, British Hydrocarbon Chemicals Limited commenced the construction of a plant at Grangemouth to produce Phenol. The process to be used was developed by your Company, and it has been licensed widely overseas where a number of plants are in successful operation.

Murgatroyd's Salt and Chemical Company, in which we have an equal interest with Fisons Limited, again had a successful year. Chlorine production was in advance of designed capacities, which enabled the Company to cover the increased requirements of our Plastics Division and other consumers.

BIOCHEMICAL DIVISION. Keen competition persisted at home and abroad, but

THE DISTILLERS COMPANY LIMITED

although the prices obtainable for the basic antibiotics were no higher, our total sales rose in value by 33¼ per cent compared with the previous year. Lower production costs contributed substantially to the improved earnings for the year.

Our research workers have opened up a new field by the discovery of a Vitamin B. 12-peptide complex which is an effective oral treatment for pernicious anaemia. This further displacement of the injection method constitutes a major advance comparable with our introduction in this country of penicillin V for oral administration. The new product was marketed on 1st July, 1958, under the trade-mark "Distivit" Oral.

PLASTICS DIVISION. The three major companies comprising our Plastics Group, namely, British Resin Products Limited, British Geon Limited, and Distrene Limited, all record satisfactory progress. The Plastics industry in this country, as a whole, showed marked growth during the year, and although competition was keen, our position in the home and overseas markets was well maintained.

Our range of synthetic resins and moulding powders, polyvinyl products (p.v.c.) and "Styron" polystyrenes, are finding an increasing diversity of industrial applications. These new uses are greatly facilitated by our Consumer Research laboratories and the technical service team we provide to study the wide variety of consumer problems in conjunction with our customers.

TECHNICAL DEVELOPMENT

Your Company employs some 425 professionally qualified scientists and engineers in its various technical departments outside the production field, and its annual appropriation for this highly important work has reached a total of £1.75 million.

TRADE NOTES

ICI Nylon Exhibitions

Three exhibitions to illustrate the industrial uses of nylon are being held by ICI Pastics Division, at the Chamber of Commerce Assembly Room, Birmingham, on 23 and 24 September, the Angel Hotel, Cardiff, on 14 and 15 October, and the Grand Hotel, Charing Cross, Glasgow, on 29 and 30 October. Most of the exhibits will be injection moulded, but extrusions and other methods of fabrication will also be featured.

Thermalite's New Factory

Production of Thermalite-Ytong loadbearing insulating building blocks has started at the new £¾ million Thermalite factory built at Hams Hall, Birmingham, where, it is claimed, the most modern machinery of its kind in the world has been installed.

An important constituent of Thermalite-Ytong is pulverised fuel ash. The new factory will draw its supply of 30,000 to 45,000 tons a year from Hams Hall Thermal Power Stations, so making a significant contribution towards solving the ash disposal problem at this site.

Thermalite-Ytong lightweight cellular concrete building blocks are loadbearing, insulating and fireproof, and are used in industrial and domestic building.

New address of the head office and sales branch of Thermalite Ltd. is Hams Hall, Lea Marston, Sutton Coldfield, Warwickshire. Telephone no. Coleshill 2081.

Changes of Address

The publicity and advertising section of Acheson Colloids Ltd., has moved to 70 Hill Street, Richmond, Surrey. Tel.: Richmond 5481.

Dr. M. A. Phillips and Associates and the Southern Chemical Plant Co. Ltd., have moved to 9 Western Road, Romford, Essex. Tel.: Romford 46992.

From 1 September, the London office of the following companies in the Manchester Oil Refinery Group will be at 76 Jermyn Street, London SW1 (Whitehall 8411): Manchester Oil Refinery (Holdings) Ltd., Manchester Oil Refinery Ltd., Manchester Oil Refinery (Sales) Ltd., Raven Oil Co. Ltd., Flexibox Ltd., Marine and Industrial Lubricants Ltd.

Cawkell Research and Electronics Ltd. have moved to new premises which enable them to increase production and development facilities. The new address is Scotts Road, Southall, Middx (Southall 3702 and 5881). The company's range now includes: multi-channel oscilloscopes, non-destructive testing equipment, noise and vibration measuring sets, pulse equipment, continuously variable band-pass filters, stabilised power supplies, etc.

MS4 Silicone Compound

MS4 silicone compound, available in tube form from Holiday and Hemmerdinger Ltd., 71 Ardwick Green North, Manchester 12, distributors for northwest England and North Wales, is an insulating and waterproofing compound stable from −50° to +200°C. It can be applied by brushing or wiping or may be sprayed when dispersed in a solvent such as carbon tetrachloride, trichlorethylene or aromatic solvents.

Uses include the making of surfaces water repellent; preventing moisture seepage along leads; as an antioxidant when applied to plastics and synthetic rubber; keeping natural and synthetic rubber components flexible; preventing corrosion and sticking of machined surfaces and gaskets, etc.

Cooling with Air

Air cooling equipment made in the US by the Hudson Engineering Corporation is now being produced in the UK under licence at the Caledonia Engineering Works, Paisley, of A. F. Craig and Co. Ltd. A new brochure listing the equipment available, which includes the Craig Hudson Auto-Variable pitch fan for accurate temperature control, can be obtained on request from the Scottish company.

Gas Atmospheres Division

The Incandescent Heat Co. Ltd., Smethwick 40, Staffs, who for many years have built plant for controlled atmospheres and gas drying have now established a gas atmospheres division to co-ordinate design, development and sales of atmosphere generators, purifiers and gas driers.

KEEBUSH

Keebush is an acid-resisting constructional material used for the construction of tanks, pumps, pipes, valves, fans, etc. It is completely inert to most commercial acids; is unaffected by temperatures up to 130°C; possesses a relatively high mechanical strength, and is unaffected by thermal shock. It is being used in most industries where acids are also being used. Write for particulars to—

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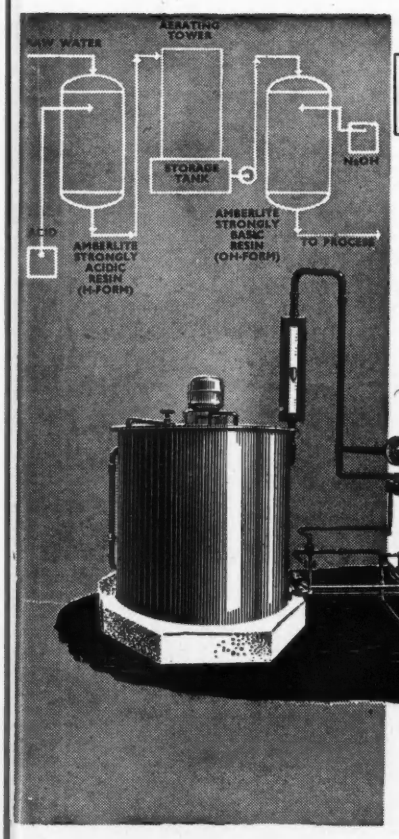

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Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 1 October

Synthesis of condensable hydrocarbons. Minister of Power. **802 145**
Uranium alloys. Seybolt, A. U. **802 147**
Process and apparatus for distillation. Dunlop Rubber Co., Ltd. **802 148**
Deaerators and deaerating plant. Hick, Hargraves & Co., Ltd., and Nicol, C. S. **802 149**
Removal of solid or liquid particles from a gas. Imperial Chemical Industries, Ltd. **802 367**
Treatment of hydrophobic artificial fibres. Farbwerke Hoechst AG. **802 150**
Method of minimising slag adhesion in furnaces and compositions therefor. Coltrate, Ltd. **802 322**
Sized paper and process for preparing same. Hercules Powder Co. **802 356**
Metallisable mono azo dyestuffs of the benzene-azo-indazole series. Compagnie Française des Matiéres Colorantes. **802 076**
High polymeric polymethylene terephthalates. Kalle & Co. AG. **802 077**
Use of ketene dimers in the sizing of carbonate-filled paper. Hercules Powder Co. **802 357**
Lignocellulosic-lignin compositions and adhesive compositions containing same. Agrashell, Inc. **802 323**
Continuous industrial production of panels, slabs or sheets of mineral fibre conglomerate, in particular glass fibre conglomerate. Algemeene Kunstrezel Maatschappij N.V. **802 158**
Production of porous or homogeneous polyurethane plastic semi-finished or finished articles or products. Farbenfabriken Bayer AG. **802 324**
Heterocyclic derivatives and process for their preparation. Soc. des Usines Chimiques Rhône-Poulenc. **802 244**
Alkyl polyglyceryl ether compounds. Hedley & Co., Ltd., T. **802 325**
Production of pellets of thermoplastic material. Imperial Chemical Industries Ltd. **802 160**
Recovering urokinase from urine. Abildgaard, K. [trading as Lovens Kemiske Fabrik Ved A. Kongsted]. **802 326**
Synthetic resins. Imperial Chemical Industries, Ltd. **802 245**
Preparation of oil-soluble metal sulphonates. Lubrizol Great Britain, Ltd. **802 164**
Benzthiazyl sulphonamides and their use as vulcanisation accelerators. Imperial Chemical Industries, Ltd. **802 079**
Treatment of waste pickle liquor and similar liquors. Otto Construction Corp. **802 269**
Derivatives of piperazine and the manufacture thereof. Wellcome Foundation, Ltd. **802 080**
Derivatives of triazine and the manufacture thereof. Wellcome Foundation, Ltd. **802 122**
Buoyant bodies of polyurethane foam and a process for making same. Farbenfabriken Bayer AG. **802 329**
Polymerisation process. Esso Research & Engineering Co. **802 082**
High strength single crystals of iron. General Electric Co. **802 251**
Organopolysiloxane rubbers. General Electric Co. **802 083**
Protective coatings for metals. Shreir, L. L. **802 276**
Making plastic foams from polyurethane products. Du Pont De Nemours & Co., E. I. **802 375**
Delustring of high molecular weight, synthetic linear polymers. British Nylon Spinners, Ltd. **802 085**
Desludging apparatus for use with sedimentation tanks. Thatcher, H. D. **802 171**
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Production of solid cyanides. Bergwerksges Ellschaft Hibernia AG. **802 091**
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Disazo dyestuffs derived from 4, 4¹-diamino-3, 3¹-dicarboxydiphenyl. Farbenfabriken Bayer AG **802 097**
Copper-containing azo compounds. Farbenfabriken Bayer AG **802 098**
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Synthesis of carotenoids and substances usable therein. Hoffmann-La Roche & Co. AG. **802 136**
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Non-toxic pesticidal compositions. Lubowe, I. I. **802 111**
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Detergent compositions. Hedley & Co., Ltd., T. **802 302**
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Process for production of a pure alkaloid. Ciba Ltd. **802 349**
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International Dairy Congress Planned for June 1959

The 15th International Dairy Congress will be held in London during June 1959. A provisional programme giving time-table of events, list of congress liaison officers in different countries, details of how to participate in the congress, and forms for applying for membership has been published.

Copies can be obtained from congress liaison officers or from A. W. Marsden, Organising Secretary, 15th International Dairy Congress, 86 Brook Street, London.

Publications Received

Glass Sink Traps and Waste Lines: Q.V.F. Ltd., Duke Street, Fenton, Stoke-on-Trent.

Hycar Nitrile Rubber Latices: British Geon Ltd., Devonshire House, Piccadilly, London W1.

Science and Engineering: Full-Time and Sandwich Degree and Diploma Courses in technical colleges, London and the Home Counties, 1958-9. Regional Advisory Council for Technological Education, Tavistock House, South, Tavistock Square, London, WC2.

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Introducing Londex SM Series Miniature Relays data sheets. Londex Ltd., Anerley Works, Anerley Road, London, SE20.

Plumbing in Polythene: Chemical Pipe and Vessel Co., Ltd., Godstone Road, Kenley, Surrey.